PDR

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PARTS I and II

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of the

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PART I

C O N T E N T S

PDR The PAKISTAN DEVELOPMENT REVIEW

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PART II

C O N T E N T S

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Inaugural Address

NADEEM UL HAQUE

My fellow social scientists, economists, scholars, thinkers, observers.

Welcome to the 26th Annual General Meeting and Conference of the Pakistan Society of Development Economists—a society that prides itself on being the only "professional association of economists and other social scientists" in the country.

This annual event serves many purposes: it is an intellectual exchange allowing a stock taking of research and ideas; it is a showcase of fresh understandings and analyses of the Pakistani economy and society; it is a place to review policy and develop constructive policy debates to improve economic management; and it is also a place to develop economists and prepare them to lead development thinking in the country. I was happy to see that the agenda contains a number of panels with leading Pakistani economists discussing a burning issue of the day—fiscal federalism which we are facing with the 18th amendment and the NFC award. We will all await ideas that are generated from the PSDE.

Most important of all conferences like the PSDE are for developing collegiality, intellectual networks, and idea and policy coalitions. Exchanges of ideas allow for civilised polemics to take place, allow policy and idea coalitions to develop and thus lead us all to deeper understanding of the complexities of society polity and the economy. So it is only fair to ask ourselves, how well *have* we taken care of the economy? How far have we progressed in these 26 years?

How much have we progressed in 26 years?

1. Of the 26 years that PSDE has been meeting we have been in a Fund programme for about 22 years.
2. Macroeconomic stability remains elusive. Inflation has now remained in double digits for about 4 years and threaten to slip beyond 15 percent (see Chart 3).
3. Despite efforts, the fiscal deficit remains beyond levels that would be considered sustainable. Not only is debt growing rapidly, SBP financing of the deficit is contributing to inflation. (see Chart 1).[1]

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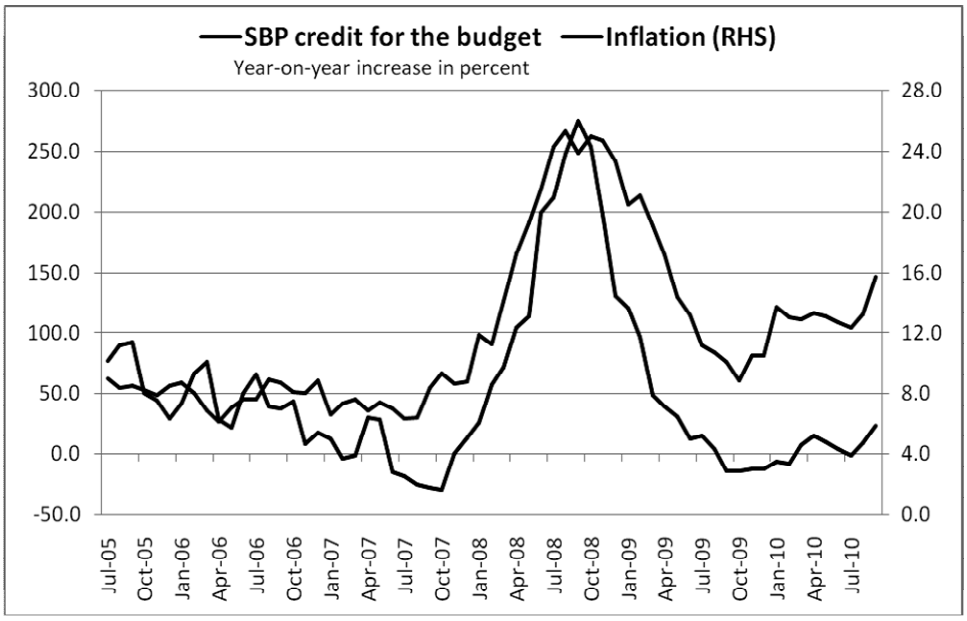
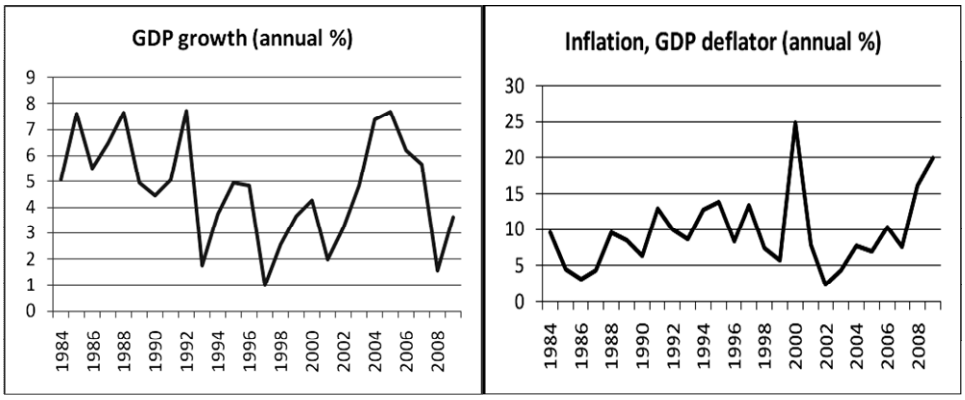
[1] Those who continue to doubt the money supply-inflation link see chart by Sakib Shirani in text.

4. Despite some privatisation and liberalisation, public sector and government continues to pervade markets through loss making public sector enterprises and excessive regulation at the cost of productivity, growth and employment. PSE losses are now dominating the budget.
5. Our growth remains volatile averaging about 5 percent per annum over the last 20 years. For Pakistan to become a middle income country we need a sustained growth of about 8 percent. (see Chart 2).



Source: Economic Advisor's Wing, Ministry of Finance, SBP.

6. Continual preoccupation with short term stabilisation along with an unstable political and security situation has kept policy and public attention crisis oriented at the expense of medium term thinking that is required for building institutions and the software for growth.
7. Internationally available indicators such as "competitiveness", "Investment Climate", "Enterprise Surveys" point to weaknesses in governance as major constraints to growth. Growth diagnostics [Qayyum and Khawaja, *et al*.] point to the same issue.
8. Without sustainable growth, continued fiscal crises, a bloated public sector that places pressure on the budget and lowers productivity and growth, welfare indicators such as poverty and the MDGs are not showing improvement. A large percentage of our population remains clustered around the poverty line swinging in and out of poverty with every dip and rise of the growth rates.
9. The regime of subsidies and protection leads to the structure of our industry remaining quite resilient to change. As a result our exports are confined to low value added items.

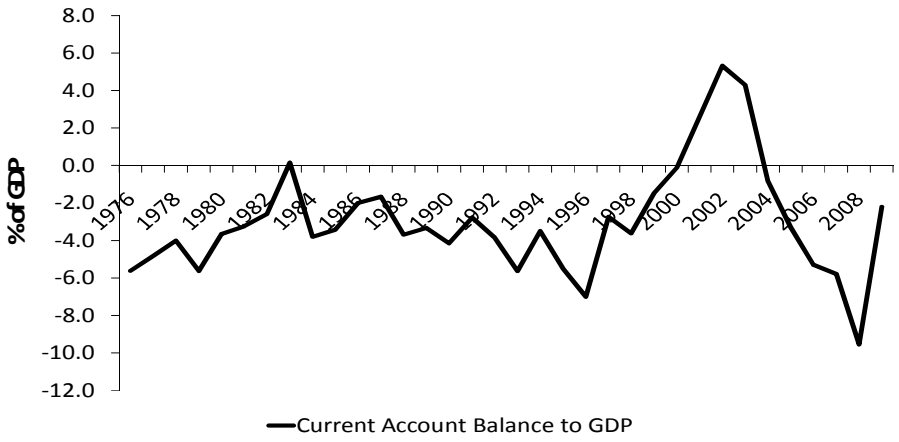


How have we contributed?

I hope you agree that it is worth asking, while all this has been happening how have the PSDE and its members (or the academic and research community at large) contributed to policy in this period?

- Are they complicit?
- Were they at the table of policy-making?
- Have they been an agency of restraint for overbearing government?
- Have they been measuring poor public service delivery?
- Have they been developing approaches to bettering our governance?
- Have they even contributed to the debate on the NFC or the 18th amendment?
- Have they any research or commentary on how government and its agencies are organised?
- How have they illuminated our view of the hemorrhaging PSEs?

Current Account Balance to GDP
1976–2009



In short were the development economists playing the role that was expected of them—that of keeping a focus on emerging issues in the economy and forming policy and idea coalitions around important issues? When society, parliament or government is looking for ideas for solutions they should be able to turn to a community of scholars for informed debates and analysis! I use three indicators to review this question.

- The newly uncaged media should be turning to this body of research for informed opinion. Unfortunately this is not happening!
- Recent policy initiative like the PRSP, the economic plans, the NFC and the 18th amendment too does not seem to be informed by domestic debates.
- The local government initiative was introduced and then vitiated without much analysis or commentary from the informed community.

I approached a few of our eminent economists to get more information on the role of our economists and policy thinkers. I am sad to report that the general feeling was that the community of economists was not exerting the sort of pressure that it is in other countries. Generally they felt that policy and idea communities do not exist in Pakistan and that research communities despite conferences have failed to affect the policy debate. Indeed some individuals well known to all of us have played a role but not the thinking community.

Meanwhile donor evaluation reports such as the IMF prolonged use and the World Bank OED reports have been self critical noting design flaws but most of all the need for *domestic policy development and ownership*! But how can we have *domestic policy development and ownership* without the development of a domestic research agenda led by domestic policy communities who are putting the microscope on local issues and problems.

It is commonly known that our development approach has been focused on aid led projects. Many projects later, development has been patchy and sporadic! Yet there are few analyses of this approach to growth policy. PIDE [Ghani and Musleh ud Din] does have a paper on the relationship between public and private investment but that can only be regarded as a beginning! There is a feeling that quick fixes were favoured over difficult and essential reforms for institution-building and developing better governance! Thus for example the pressure to fix the budget through temporary expenditure cuts and some tax reform leaving the structure of governance as inefficient as ever may be self defeating. A long lasting sustainable solution might require fixing governance structures from the foundation up. This would require a sustained debate to inform our understanding of the evolving role of government. It would mean going beyond the old "market vs. government" debate to how to build both better government and better markets.

Even though quality of our governance and institutions remains the major constraint on our growth, research and debate on these issues is lacking. We at PIDE and PSDE began this work but quickly lost focus. Why?

As Past President of the PSDE, I invite you PSDE members to review our responsibilities as social scientists of Pakistan!

Let me also say I appreciate the difficult role of an academic in this society.

Research is not highly valued here! But the researcher has not developed research on burning issues of the day to be relevant. Poor quality social science has also misinformed and reinforced hierarchy and the status quo. Research in Pakistan has become timid. It is contaminated by consulting. It does not respond to the key issues of the time such as governance, democracy, institution-building, entrepreneurship migration, cities and inclusion issues. It is not question driven. It is slavish to methodology and data. Why, for example, has the Pakistani economist not written papers on qabza, property rights, eminent domain, regulation, markets, governance? Why do we continue to run regressions on old issues and old question, and merely copying methodologies?

A Domestic Research Agenda and Debate

Pakistan is faced with several serious challenges. For our purposes the most important of these is our chronic fiscal problem that continually destabilises the macroeconomy and inability to achieve sustained high growth. Clearly our research efforts and our debates need to focus on these issues.

Even the Fund conceded in its prolonged use report that our fiscal problem may lie in the micro-structures of governance or our lack of quality fiscal institutions. For a longer term resolution of the fiscal problem, it seems that we may need to address issues such as the role of government, budgetary and expenditure control processes, the efficiency of government, the quality of public service delivery, the size and structure of government. The range of questions is large and could constitute a long term research agenda. But it is such research agenda that can act as check on government and articulate the reform that might be necessary for a longer term and lasting fiscal adjustment.

Pakistan's growth strategy has been put on the backburner by our continued preoccupation with crisis. The medium term is almost missing from our policy and debate. Yet almost all country experiences and what we learn from the new growth literature tells us that there is a need for a longer term focus to our policy. To develop this policy we need to understand what constrains our growth and then figure out the reforms that could remove these constraints. We have begun such an exercise at the Planning Commission and I will share that with you at the Quaid-i-Azam lecture. Briefly, it seems that the same issues that are leading to our fiscal problem are also holding back growth. The government has expanded its role into markets through inefficient PSEs and poor regulation to slow down exchange, innovation and entrepreneurship. Poor quality governance has reduced prodcutivity and increased transactions costs everywhere. The incentive system that this poor quality governance system seeks to reinforce is for rent-seeking and not merit and entrepreneurship.

Consequently, it is our conclusion that reform of governance and markets needs to be very seriously mainstreamed for addressing both the macro and the growth problems. This reform must seek to modernise our outmoded systems of incentives, management, human capital, procedures and technology in the running of government. In addition this reform must seek to reduce the size of government eliminating agencies that are involved in the market.

This reform agenda requires a huge amount of research work, involving micro analysis, detailed measurement, learning from international research and experience, case studies and analysis of the current legal and regulatory frameworks.

For growth, we have to move beyond sector policies, PSDPs, ADPs, acronyms and metaphors. We need to think beyond 'brick and mortar'. A whole new intellectual endeavour has to take place.

Policy and Research Communities

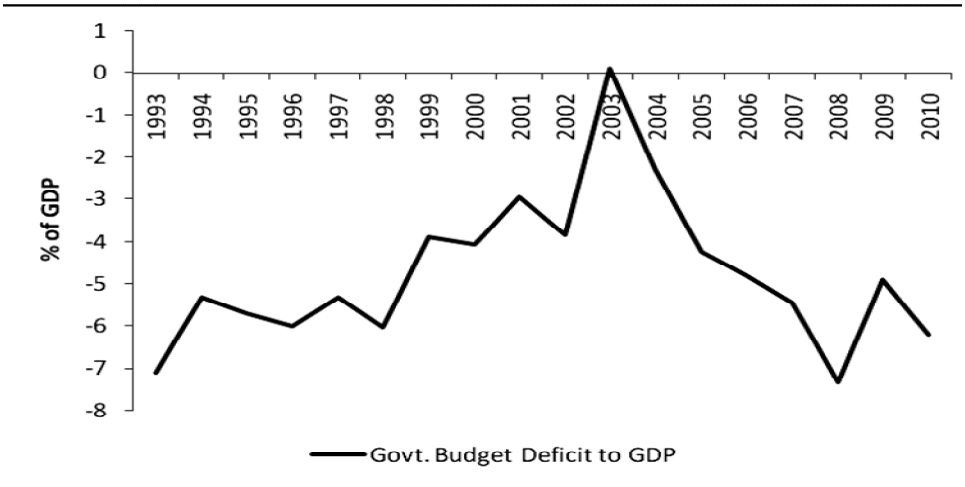
As I mentioned in my farewell speech at the PIDE (Sad Plight…) it is not enough to develop research and put it out in some journal. Research is only noticed and taken seriously when it leads to policy and citation communities. Such communities form around ideas of mutual interest to discuss and debate competing hypotheses using the best evidence available to develop useful knowledge and actionable policy ideas. This requires teamwork, patience, focused discussion and gracious engagement. Most people I spoke to felt that these qualities our academics seriously needed to cultivate.

We are yet to develop effective policy and research communities around key issues of current concern. We are yet to promote the necessary citation culture. And we are yet to establish ourselves to holding debates which produce innovative solutions to our age old socio-economic problems.

Until the development economist does not address the real questions facing this society and does not do the hard work necessary to form the policy and citation communities why should it be taken seriously.

In conclusion, while discussing the important issue of fiscal federalism we need to keep the issue of the role of the research community on influencing policy and societal views in mind. Remember it is ideas that lead society! Research and writing has been a precursor of change and modernisation. It must be so in Pakistan too! For that you have a large role to play! I urge you to play it well!

Government Budget Deficit to GDP
1993–2010



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The Presidential Address

Fiscal Decentralisation: Empowering the Provinces, Strengthening the Federation

RASHID AMJAD

Dr Nadeem ul Haque, Deputy Chairman, Planning Commission and Patron Pakistan Society of Development Economists, Prof. Syed Nawab Haider Naqvi, Founder President of the PSDE, Dr Musleh ud Din, Secretary and Dr M. Idrees Khawaja, Joint Secretary of PSDE, Past Presidents and Distinguished Members of the Society.

Excellencies, Ladies and Gentlemen,

It is my pleasure to welcome you all to the 26th Annual General Meeting and Conference of the PSDE. I would like to thank you Deputy Chairman and Past President of the PSDE for your time to inaugurate the meeting. I would like to thank our members and many guests who have come from all over Pakistan and abroad to participate in the Conference. A special welcome to students of economics and business studies from PIDE and different universities in Islamabad and from different parts of Pakistan, who are I am sure, just as eager as the senior members to understand the issues to be discussed at the Conference better.

Let me join Dr Musleh ud Din in welcoming our distinguished speakers, Dr Vito Tanzi, Dr Ehtisham Ahmed and Dr Anwar Shah who will be delivering the invited lectures this year. Our chief guest, I might add at short notice, will deliver the prestigious Quaid-i-Azam Lecture this year.

Distinguished Members, I am happy to announce that next year PIDE and the PSDE will celebrate the Golden Jubilee of *The Pakistan Development Review*, more popularly known as the *PDR*. Its first issue came out in 1961. We will also be honouring at this Conference Dr Azizur Rahman Khan, the well known development economist who spent many years at PIDE and who was the first Pakistani Editor of the *PDR* (and contributed the well-known article on Financing Pakistan's Second Five Year Plan in the very first issue of the *PDR*.)

Fellow economists and social scientists, Pakistan today and its economy faces serious challenges and grave threats. From its well-known "Pakistani growth rate of 6 percent" and historical average over the last 40 years of between 5–5.5 percent the economy has been growing in the last three years (2007-08 to 2009-10) at an average of around 2–2.5 percent. Mainly as a result of the unprecedented floods this summer the

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economy is expected to grow at around half the projected growth of 4.5 percent in 2010-11. With inflation at around 15 percent the economy is in deep stagflation.

This is an untenable situation. Despite some silver linings in these difficult times, such as rising global food prices and unprecedented hike in prices of cotton yarn, resulting in a spurt in exports, and growing remittances in the first half of 2010-11, the overall situation, remains grim. Severe energy shortages and security concerns are acting as a major dampener to business confidence and thus to badly needed domestic and foreign investment.

The fundamental economic challenge Pakistan faces today is how to break-out of stabilisation into higher, sustainable and inclusive growth. Yes, macro stability is a pre-requisite for sustained growth and for building investors and donors confidence and must remain an avowed aim. But growth is also essential for macro-stability.

The reasons why the current situation of low economic growth is untenable are fairly well established. Our high growth of labour force, at around 3 percent, needs a minimum growth of 7 percent to absorb just the increase in labour force (we must grow faster if current unemployment and underemployment is to be reduced). Lower than this minimum growth means not only a deteriorating labour market situation and rising unemployment and underemployment but also worsening poverty given the close nexus between job creation and poverty reduction.

The much faster growth of countries in the region (China, India and now Bangladesh) at between 7.5 to 10 percent not only makes our growth performance look dour but also means that we are loosing competitiveness as faster growing economies experience rising productivity and rising new investment—key driver of new technology, new products and improved infrastructure.

Yet, to my mind perhaps the most important reason to break-out into higher growth is the pall of gloom that is enveloping people in all walks of life—not just in Pakistan, but also Pakistanis abroad as well as well wishers of Pakistan—and this makes fertile breeding and recruiting ground for those who want to destabilise and disrupt the country.

Dr Nadeem ul Haque's theme for the Quaid-i-Azam Lecture in this Conference is "Can Pakistan Grow Faster?", and this with some other papers, will I am sure provide food for thought, spur debate and discussion on this fundamental issue. Let me just say here that the two critical areas where we really need to move forward are revenue generation and economic reforms (especially SOEs) and this requires strong political will which appears to be sadly lacking.

In these difficult and indeed distressing times, without detracting from current economic realities, we can be forgiven for over looking some of the important positive developments that have taken place in recent years, which to my mind can serve as major drivers of growth over the medium and long term. We must start thinking beyond stabilisation.

These are the dividends that flow from having a free and vibrant media, an independent and highly respected higher judiciary and empowered provinces as a result of the 18th Constitutional Amendment. The 18th Amendment is democracy's gift to the people of Pakistan and a vigilant and free print and electronic media together with an independent and strong judiciary the best guarantee for ensuring transparency and good governance. These are essential ingredients for building-up a vibrant economy.

There is perhaps more than a grain of truth in the assertion that we may have not fully done our homework in working out the far reaching impact and implications on the economy of Pakistan of the 18th Constitutional Amendment and 7th NFC award.

I remain convinced, however, that the 18th Constitutional Amendments (together with the 7th NFC) by empowering the provinces will truly strengthen our Federation. Such a Federation was always envisaged by the founder of our Nation, is enshrined in the 1973 Constitution, and had it not been for the constitutional deviations made under military dictatorships, should have been in place much earlier. Any further delay especially in the current geo-political situation may well have been too late.

The fact of the matter to paraphrase in simple words Ahmed and Brosio (2008) important message in the "Handbook of Fiscal Federalism", is that this is a "learning by doing" process. To quote, "Assignment of responsibilities derives not from principles but from bargaining and competition between government (at different levels)".[1]

As we have seen in the debate on the collection of sales tax on services or in the delay in the imposition of the R-GST, the change over to the new economic arrangements is going to be challenging and contentious. What is vital is that we learn from the process, feed this back into the decision making mechanism and move towards finding and implementing pragmatic solutions. If we allow the process to get bogged down not only will the economic costs be high but the very fundamentals of the changes may increasingly be questioned.

The theme of this Conference is, therefore, not only timely but addresses some of the very critical issues that arise out of the new economic arrangements stemming from the 18th Constitutional Amendment and 7th NFC Award.

I am very grateful to the contributors to the technical sessions, the panel discussants and those giving the invited lectures for the work and effort that has gone into analysing and addressing critical concerns and issues emerging from the 18th Constitutional Amendment and 7th NFC Award—whether they relate to revenue generation, macroeconomic management, infrastructure development, delivery of social services sharing and development of mineral resources and other important issues. This is a new area for many of us, and as important as the papers to be presented, will be the identification of areas for further research and analysis which will emerge from these discussions.

Let me pose a few key questions which I hope will be examined in this context at this Conference.

- How critical is increasing our revenues (e.g. increasing Tax/GDP ratio from 9 percent to 15 percent in the next 5 years) to ensuring the smooth functioning of the new economic arrangements resulting from the 7th NFC and 18th Amendment?
- What changes in the current arrangements are needed to ensure prudent macro-management of the economy to move towards attaining macro-economic stability and reigniting economic growth? Or more specifically how do you ensure effective participation of the Provinces in macroeconomic management and a buy-in from them in meeting macro-economic goals?

[1]Ehtisham Ahmad and Giorgio Brosio (ed.) *Handbook of Fiscal Federalism*. Edward Elgar, UK. p.11 (brackets added).

- With the delivery of key social services (education, health, special welfare) being devolved to the Provinces what role if any should the Federation play in these sectors including ensuring that adequate resources are made available to them and their cost-effective delivery?
- With infrastructure development becoming an important part of the Provincial Development Plans, given the increase in resources now available to the provinces, what should be the demarcation between the Federal PSDP and Provincial Annual Plans in the formulation and implementation of new infrastructure projects? What should be the criteria (e.g. specific sectors, total size of project, coverage, strategic importance) for this demarcation?
- How do you ensure achievement of national and international goals (MDGs) such as poverty reduction and reducing inter-provincial disparities in income and in HDI indicators under the new arrangements?
- What would be the role of local governments in the new arrangements?
- How to ensure capacity in the Provincial Finance Departments and Planning Boards to undertake their new responsibilities? Also how best to fulfill the need for provincial national income accounts and information on key economic indicators at the provincial level?
- What lessons can we learn from international experience including from our neighbour India?

These are but some of the key issues to my mind that need urgent attention.

This Conference would not have been possible in these financially stringent times but for the support we have received from many quarters. I would like to especially place on record our thanks to the Forum of the Federations and its President and CEO Mr George Anderson for their very generous support for the holding of the Conference. Let me also thank for the financial support received, from the Higher Education Commission (HEC), the Canadian International Development Agency (CIDA), our old friends the Friedrich Ebert Stiftung (FES) and USAID.

Last but not least let me thank the Executive Committee of the Society, the Secretary Dr Musleh ud Din and the two Joint Secretaries Dr Idrees Khawaja and Dr Moshin and all the PIDE staff for their untiring efforts in hosting this Conference.

I thank you for your patient hearing.

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The Allama Iqbal Lecture

Improving Governance in Pakistan: Changing Perspectives on Decentralisation

EHTISHAM AHMAD

Allama Iqbal stressed the need for *khudi* in terms of national identity and focus on self-reliance, without which there would have been no chance to break colonial bounds. The message still resonates today, in a period of economic crisis and lack of national agreement on tax reforms. International experience with decentralisation also emphasises the importance of significant own-source revenues in generating accountability and effective service delivery at all levels of government. Although the 18th Amendment of Pakistan Constitution makes significant strides towards clarifying spending responsibilities, the issue of subsidiarity is not effectively addressed, nor is the issue of implementable own-source of revenues. This runs the risk of generating unfunded mandates, further pressures and weakening of public service delivery, leading possibly to strengthening of ethnic and parochial divisions and centrifugal forces. Iqbal's message is as important now as it was in the last century.

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Keywords: Intergovernmental Fiscal Relations

The passage of the 18th Amendment to the Pakistan 1973 Constitution came by as the result of a demand from a wide spectrum of political parties that see the issue of basic spending as part of provincial responsibility in line with the federal structure of the constitution. But will this major reform work effectively and ensure higher living standards for all the people in all the provinces? To what extent is the need for a national identity important in ensuring that the decentralisation does not lead to an unravelling of the Federation or deterioration in the overall delivery of public services and the greater inclusion of the poor? In this context it is useful to touch on the philosophy of Allama Iqbal that was one of the main factors that led to an impetus for a demand for a homeland for Muslims in India. We also examine the different approaches to nation-building and fiscal federalism that have led to the creation of vibrant federations. Evaluating international experience could play a valuable role in pointing out pitfalls and options for making the decentralisation process work in Pakistan.

In Section 1, we review some elements of Iqbal's thoughts, and the implications of this for the sort of federation that has evolved in Pakistan. Section 2 examines

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Author's Note: This paper was written jointly with Dr Mahnaz Ahmad, who is responsible for the sections on Allama Iqbal's Persian poetry.

developments in theoretical understanding in addressing the steps that might be needed to ensure that the objectives of improving governance through decentralisation are met in an efficient manner. Bilateral and multilateral agencies have been quite active in advising on decentralisation processes. The multilateral banks have done so partly because of the belief that decentralised service provision can provide better for the poorer sections of society by utilising the information that may be available at the local level in tailoring the services to the preferences of the population, and making access easier. Their views have evolved, as the difficulties with the first approach have been better understood. Bilateral agencies have more explicit geo-political objectives, and sometimes these translate into trying to create societies and political structures that resemble their own in the expectation that this will lead to a congruence of interests. But quite often, the support has been given to those governments that tend to agree with the donor countries, especially in times of crisis, and under these circumstances the support can often go the other way, as was seen in Pinochet's Chile, Suharto's Indonesia, and Zia and Musharraf's Pakistan. This is followed in Section 3 by some recent examples from around the world, for both unitary and federal states, and the political economy issues involved in any decentralisation process

Section 5 focuses on some of the challenges that Pakistan will have to face in order to become a fully functional and prosperous federation, and the dangers if the proposed tax reforms were to fail.

A concluding section reiterates Iqbal's message of hope, but underlines the need for a renewed sense of national identity and unity to offset parochial self-interest and destructive rent-seeking that has become so rampant in the country.

1. "KHUDI"—AND THE PHILOSOPHY THAT LED TO THE CREATION OF PAKISTAN[1]

Allama decried difference between people of the sub-continent, especially the Muslims, as the main case of the backwardness of the nation. He very much understood the dynamics of the politics of the time, including the colonial environments and the progress made by other groups. However, he distrusted the politicians and the rhetoric of the politicians. See Verses 1 for verses from a powerful poem "what should be done, O people of the East?"—decrying the lack of wisdom of the elders, and the lack of compassion of the youth, leading to an aimless life of servitude to others.

A second selection of verses (Verses 2) attacks the false cloak of democracy and freedom that actually binds the dispossessed in an even tighter vice. Abusing the advice from abroad, vested interests increase their dominance in the name of democracy, leading to an absence of development.

Allama Iqbal was cognizant of the need for a strong moral basis for a self-reliant society, and felt that shared values and aspirations were critical for a self-reliant process of development. It was in this context that the demand for Pakistan materialised:

- "I demand the formation of a consolidated Muslim state in the best interests of India and of Islam" (Allama Iqbal).

[1]This section has been prepared jointly with Dr Mahnaz Ahmad.

Verses 1: Pas chébayádkard, ay aqwām e shārq? (So what must be done, O people of the East?)

- *Ay Himalaya, ay Attock, Ay rūd –e Gang*
  - O people of Himalaya, Attock, and Indus
- *Zistántakaichunan bi aab o rang*
  - Living without meaning for how long
- *Pirmardánazfarasát, bínasíb*
  - The elders without wisdom
- *Naujavanānazmohabbatbínasíb*
  - The young without compassion
- *Sharq o Gharbazád, va ma nakhchirghair*
  - East and West are free, but we follow others
- *Khist ma sarmāyatamírghair*
  - Our toils for the benefit of others
- *Zindeganí bar muraddigarān*
  - Living at the will of others
- *Javedānmargast, nikhoabgarān*
  - Not even deep sleep, but eternal death

The emphasis on common values and unity did not sit well with the weak federal structure for India proposed subsequently by the Cabinet Commission Mission, (May 16, 1946), as it would have led to centrifugal forces and a weak central government. For similar reasons, Nehru wanted a strong central government, and the creation of Pakistan became inevitable. Iqbal was quite distrustful of blindly copying foreign models and ideologies without thinking about the structure of society and governance that would evolve, and felt that that would engender greater dependence.

In effect, Iqbal argued for "unity, faith and discipline" as the basis for a strong and self-reliant nation. A cloak of democracy leading to divisions and disunity, as well as reliance on an external begging bowl, would have been anathema for Iqbal. This would have been equivalent to perpetuating dominance and repression under the "cloak of democracy and freedom".

Verses 2: Siasāt e hazír: politics of the day

- *Mikunad bund-e ghulamān sakht-tar*
  - Binds the disposed even tigher
- *Hurriyet mikhavand our a bi basar*
  - The naïve call it freedom
- *Garmī e hangámeh jamhūr did*
  - When they see the people's agitation
- *Pardā bar rouye malukiyat kashid*
  - They put a cloak over international globalisation and the UN (league of nations)
- *Sultanāt ra jāmeh-e-aqwám guft*
  - Cloaking domination in the garb of democracy
- *Dar Fazayash bal o par natavān gashour*
  - One can hardly develop in this environment
- *Ba kalidish beych dar natavān gashour*
  - Their solutions open no doors

Iqbal's strong belief in self-reliance and national identity permeated his political philosophy, that of *"khudí"* (or self). This did not equate to a focus on degenerate personal, parochial or group interests. It was much more of a sense of national identity and common values binding the people together.

Indeed, Iqbal was particularly concerned with divisions and disagreements amongst one's own people that could be easily solved with negotiations. He would have been mortified by current state of affairs, when, during the period of crisis, no one seems to have national interest in mind. In the context of the collapse of domestic resource mobilisation, and during a period of extreme danger and unsustainable dent, textile lobbies, the urban gentry, traders and agriculturists, all point to the other and say: "tax that group first" but "do not tax me." The inability to plug the fiscal gaps despite at least a decade of effort is tantamount to selfish interests that predominate over national priority. In particular, if there is an absence of national unity or direction –the collective *khudī*, then there is really no hope and even the highest mountains can be swept aside like "straw in the wind" (Verses 3).

Verses 3:

- *Tākhudídarsiné-ye millatbamūrd*
  - If national khudí dies
- *Kūhkahigashtvabādoúrābabūrd*
  - Mountains become straw and are blown away in the wind

There is a significant difficulty that arises from money metric-measures of "growth and development" that rely on "external" individualistic philosophies. Iqbal was very critical of such foreign ideologies that would accentuate self-seeking divisive behaviour and continued dependency. Even in present day Europe, the debate is now moving towards measures of "happiness" (Sarkozy commission) and not money-metric measures of GDP or growth. Given the concern for "sustainability" in Iqbal's philosophy, self-sufficiency and living within one's means would be at the cornerstone of his "development" strategy. While Verse 4 is couched in autarchic language, the path of freedom in a modern context lies in preventing unsustainable borrowing, and not necessarily passing up on the benefits from trade and global specialisation. The crux of his message, which also rings true in post-sub prime America, is that one should not live beyond one's means.

Verses 4:

- *"Āncheazkhāak-í tóast, ay mard-í-horĀanforoush, waāanbepoosh, waāanbekhór"*
  - freedom lover! Sell, wear and eat what you can grow (and finance)

In terms of the theme of the conference, the implications of Iqbal's philosophy is on national identity and the avoidance of centrifugal stresses by parochial and selfish

interests, and not necessarily on centralisation or decentralisation per se. The focus is more on appropriate incentives and economic sustainability as growth strategies, and compassion and inclusion of the poor and the dispossessed. These may be feasible in either a centralised or decentralised framework—the latter, for instance, in a system of subsidiarity. However, he would have been as critical of mindless decentralisation, leading to corruption and "capture" by political elites as Tanzi (2002), or Bardhan and Mookherjee (2000). The focus in Iqbal, as much as in the modern approaches to fiscal federalism would be on effective service delivery in a political economy perspective.

2. NORMATIVE OR POSITIVE APPROACHES TO FEDERALISM AND DECENTRALISATION?[2]

Developments in Theory

The post-Second World War normative literature on fiscal decentralisation has been much influenced by the experience of the United States, and the work inter alia of Musgrave (1959) and Mancur Olson (1969). These were based on the presumption that governments are benevolent. This reflected the views of Montesquieu, and of Hamilton and Madison in *The Federalist Papers,* that government should be small, and the functions should be separated with the centre responsible for issues that affect all lower levels of government, such as defence and monetary policy. The presumption has been, particularly on the part of some bilateral and multilateral agencies, that decentralisation will lead to more efficient service delivery, higher growth and poverty reduction.

Experiences outside the United States, particularly in the European Union and especially in developing countries, have led to a questioning of the normative approach, spawning a surge in the "political economy" literature [see surveys in Ahmad and Brosio (2006); Oates (2008); Lockwood (2009)]. This reflects an earlier debate, associated with De Tocqueville and John Stuart Mill, which focused on the actual workings of government and an evaluation of the pros and cons of "decentralised" operations. The main difference is that the assumption of "benevolent" government is dropped, and incentives facing politicians and bureaucrats become important, as do the role of institutions and information flows. Bardhan and Mookherjee (2000),[3] write about the possibility of "capture" by vested interests. Besley and Case (1995) introduce the concept of "yardstick competition", in which voters evaluate the performance of their local governments in relation to the results achieved in neighbouring jurisdiction. Given increasing mobility and information flow, the yardstick competition idea has recently been extended to relate to countries, as citizens in one country examine what results are achieved in other countries with which they are quite familiar [Salmon (2010)].[4]

[2]This section draws on Ahmad (2011) and Ahmad and Brosio (2006).

[3]Bardhan, Pranab and Dilip Mookherjee (2000) Relative Capture of Government at Local American and National levels. *Economic Review* 90:2, 135–39. See also Ahmad, E. and G. Brosio (2011) *Effective Federalism and Local Finance,* Edward Elgar, International Library of Critical Writings in Economics, for a selection of papers on this subject.

[4]Salmon (2010) paper presented to the SIEP Conference in Pavia. Besley, Timothy and Anne Case (1995) Incumbent Behaviour: Vote-seeking, Tax-setting, and Yardstick Competition. *American Economic Review* 85:1, 25–45.

The building blocks of both normative and positive traditions are similar—spending and taxation assignments, design of transfers, debt management and information flows and instruments for implementation. However, the sequencing and mix of the instruments might vary, as we discuss below. The situation becomes a little more complex when it comes to examination of the spending assignments. While the US Federalist tradition recommended a separation of powers, this is indeed needed for increased accountability. The critique of the normative approaches, however, comes from the European collaborative tradition, that also lends itself to centralisation or assumption of powers by the centre.

Decentralisation Trends

The impetus to decentralise has differed in many cases. In Latin America the shift from one-party or military rule has led to a resurgence of interest in decentralisation as a means of consolidating political gains, whereas a large, one-party, unitary state, China has actually been quite decentralised. And in Pakistan, the Musharraf government tried to "decentralise" using the normative precepts, but in political economy terms, the actions were calculated to bypass the provinces and the power of the political parties that tended to have a provincial focus. International agencies tended to support the normative approach to decentralisation on the grounds that this would lead to better service delivery and poverty reduction—but the evidence on this is at best mixed [see Ahmad, Brosio, and Tanzi (2006) for a discussion of the evidence in OECD countries, and see Table 1 for some trends from Ahmad and Brosio (2009)].

Like in Pakistan, many Latin American countries have experienced some movement towards decentralisation in the past two decades, often as a reaction to periods of one-party or military rule. This has been more marked on the spending side than on the revenue side. With respect to the latter, the trend has been in the opposite direction, as countries have established systems of more or less centralised systems for the VAT, sometimes with the help of the international agencies and particularly the IMF, often replacing a myriad of subnational taxes at the state and local levels.

On the spending side, despite the rhetoric, the approach particularly in the Latin American countries has been one where there are mixed and overlapping responsibilities that have not been adequately addressed. These partly reflect the centralised tendencies of the past, together with a paternalistic approach (including by donors) that do not trust the sub-national governments to make the right choices for their citizens in their area of competence (including education and social policy in general), or feel that the lower levels lack the capabilities to manage their affairs effectively. In many cases, these concerns are probably quite valid, and we shall discuss the experiences of some Federal and Unitary countries, and the approaches taken by some of the donors in this regard.

Table 1

Main Traits of Recent Intergovernmental Reforms in Selected Countries

Countries	Main Characteristics of Intergovernmental Relations	Recent Reform Initiatives
Australia	Federal system	VAT administration by center on behalf of the states, reforms introduced in early 2000s.
Belgium	Federalisation based on linguistic divisions	Transformed from unitary to federal state.
Bolivia	Three-layered unitary system	Powers of municipalities have been considerably increased. Election of Governors of Departments, some demanding substantial but asymmetrical powers—associated with natural resources.
Brazil	Federal system based on three layers of government	National reform and coordination of VAT is an urgent priority, although proposals for reform since the late 1990s have not been acted on.
Canada	Federal system	Asymmetric federation (special treatment for Quebec).
China	Highly decentralised system, within a unitary constitution. Operating like a quasi-federation	Recentralisation of taxing power (1994).
Colombia	Three-layered unitary system	Extensive devolution of resources to provinces (departments) movement towards a quasi-federation.
Denmark	Unitary system with strong municipal governments	Recentralisation of higher education and health since 2006.
France	Regional system	Regulatory, fiscal and political decentralisation initiated.
Germany	Federal system with extended concurrent responsibilities	Reforms to the Federal structure initiated in a wide ranging set of issues, but little change was effected as a result of two Commissions.
Indonesia	Unitary State	Extensive decentralisation of spending powers to district level administrations after the fall of the Suharto administration, accompanied by a new revenue sharing arrangement.
Italy	Unitary, with asymmetric arrangements	Fiscal, regulatory and political decentralisation initiated with a new Constitution.
Mexico	Federal system with high political and low fiscal decentralisation	Fiscal and regulatory decentralisation since late 1980s, with devolution to States of basic education (1992) and health care (1996), although revenues remain centralised since the early 1980s.
Pakistan	Federal Constitution, with interludes of military rule	Deconcentration to districts in the early 2000s by Musharraf. Overlapping responsibilities on the spending side unwound with the 18th Amendment to the Constitution—most spending powers fully assigned to province. Relatively little subnational reliance on own-source revenues.
Peru	Unitary state—moving towards a quasi-federation?	Election of governors of regions—sharing of natural resource revenues. Overlapping responsibilities with relatively limited spending or revenue devolution.
Poland	Unitary	Political and fiscal decentralisation with emphasis on the local level.
South Africa	The post-Apartheid constitution introduced a quasi federal system	Devolution of extensive responsibilities for education and health to provinces
Spain	Regional, quasi-federal system	Transition toward a federal system. Fiscal equalisation, with own-source revenues at sub-national level. Asymmetric assignments for some regions.
Switzerland	Federal system	Equalisation transfers from federation to cantons
United Kingdom	Regional	Introduction of regional government in Scotland and Wales.

3. POLITICAL ECONOMY OF DECENTRALISATION: INTERNATIONAL EXPERIENCES

In Pakistan, the impetus for the 18th Amendment is a reaction against a decade of military rule, including the abandonment of the focus on district and local level service delivery. This is similar to the experience in Latin America, with an intensification of the democratic process in the 1990s. In setting the stage on international experience, we focus on Colombia and Bolivia—and touch on Indonesia and Peru—as these have all followed a similar route towards decentralisation albeit at a different pace. China, which was quite decentralised, has moved towards greater centralisation, at least on the revenue side.

Chile has not taken the fiscal decentralisation route, in the manner of its fellow Andean unitary states, but has focused on improving the efficiency of the spending process, with greater accountability of the actors involved in the spending chain. To some extent this could be seen as an extrapolation of the "Chicago doctrine" of the Chilean economists. This process may be described as introducing performance budgeting in a deconcentrated and unitary environment, and not "decentralisation" as in the other countries. Perhaps in a country with a relatively small and homogeneous population, this approach may be more effective and make more sense than the rush to decentralise that has gripped many parts of the world. This may also make sense when there is a strong national identity that overrides local ethnic or other differences.

Chile's neighbour Peru, on the other hand, has oscillated between decentralisation in the 1980s, to the centralisation under Fujomori. It is a large country with marked topological differences, and considerable inequality. The lack of information available to the centre on local preferences and priorities made centrally administered social stabilisation difficult, and exacerbated labour market fragmentation. Further, weaknesses in budget processes and oversight mechanisms, permitted members of the administration to use public investment funds as a means to reelect Fujimori, or divert resources into their own pockets. Hence, the return to a phased-decentralised strategy during the last decade made a lot of sense in the Peruvian context.

Although Pakistan is a federal state, its experience has been similar to Peru, with oscillations between more or less centralised operations given its periodic experimentations with military rule. In this section, we describe some of the intergovernmental fiscal reforms in unitary states, that also involved the VAT, particularly in Peru and China, as well as some federal countries—Mexico and Brazil.

Unitary States

Bolivia

In Bolivia in the 1990s, decentralisation was held as an integral part of enhancing service delivery for the pooras part of the process of recovering from an economic crisis. The decentralisation was strongly supported by bilateral donors, as well as the international agencies (IADB, GTZ, the World Bank as well as the IMF). The IADB and the World Bank supported the unbundling of these responsibilities, and the development of the Government financial information system (GFMIS), or SIGMA.

In 1997, the onset of subnational indebtedness prompted action by the IMF, and debt limits were imposed on municipalities.[5] However, it failed to get to grips with the underlying political economy difficulties, that generate the imbalances in the first place, and the games played between different levels of government. Steps were taken in 1998 to stem the debt difficulties of subnational governments. [6] This infrastructure did not prevent the recurrence of subnational debt difficulties following the period of economic and political crisis (1999-2002).

Debt problems continued, given the difficulty in tracking subnational operations, and agreements had to be reached between the central and concerned local governments to ensure an orderly adjustment—including changing the debt composition and establishing a no-bailout provision, together with the more effective tracking of government spending through the government financial information system, SIGMA, being rolled out by the IADB and the World Bank.

By 2001, under the enhanced HIPC arrangement, donors decided that the decentralisation process was proceeding sufficiently well for the debt relief to be directed to municipal governments for health care, education and infrastructure spending, based on selective evidence.[7] There was also sufficient reliance on the efficacy of the SIGMA being developed to be able to effectively track the subnational spending, or so it was believed.

However, an assessment of the political economy perspective, found that there were significant deficiencies in the design of the decentralisation process—particularly governing the allocation of HIPC-II funds to municipalities.[8] Funds were allocated in areas where the local governments had little or no responsibility—particularly education and health care, as the departments hired the staff, that were paid for directly from the central budget. The local governments were not particularly inclined to use funds for these purposes, and with limited own-source revenues, there were no incentives to do so efficiently. Plus, the transfer system was not particularly "equalising", and the attempt to pacify the natural resource producing regions through hydrocarbon revenue sharing was not especially effective. Moreover, the SIGMA information system had been poorly designed, and even if it had been properly designed, had little chance of providing the discipline that was missing in the previous institutional framework.

A careful empirical analysis by a Bolivian economist found, using successive household level surveys, that the use of the HIPC-funds by local governments had virtually no correlation with improvements in living standards [Inchauste (2008)].[9] Even when considering infrastructure, which is where much of the spending took place, there was no strong evidence that access to infrastructure improved significantly.

[5]Under the 1997 budget law, debt service was limited to 25 percent of revenues, and debt stock to be lower than 250 percent of revenues. This reflected the Colombian municipal debt law.

[6]Pérez, L, G. Brosio, I. Coelho, J-L Ruiz, J-R Ruiz, 1998, Bolivia: *Las relacionesfiscalesintergubernamentales—propuestasparamejorar el uso de recursos y el manejomacroeconómico*, FAD, IMF.

[7]Faguet, J. P. (2004) Does Decentralisation Increase Government Responsiveness to Local Needs? Evidence from Bolivia. *Journal of Public Economics* 88:4, 867–93.

[8]Ahmad, Ehtisham, Giorgio Brosio, Alicia Díaz-Zurro, I Fainboim, Renato Villela and Carlos Parente (1994) *Bolivia: Improving Budget and Decentralisation Processes*, IMF, FAD.

[9]Inchauste, Gabriela (2009) Decentralisation in Bolivia: has it Made a Difference? In Ehtisham Ahmad and Giorgio Brosio (eds.) *Does Decentralisation Enhance Service Delivery and Poverty Reduction?* Edward Elgar.

The issue with natural resources in Bolivia is that the petroleum resources are generated in regions that are ethnically distinct from the majority indigenous population of the *altiplano*, which tend to be among the poorest. This tends to fan separatist tendencies in the producing regions (as was the case in Biafra in Nigeria, and Acheh in Indonesia). There is a tradeoff between macroeconomic management or the redistributive functions of the central government, and the political economy consideration of keeping the country together. It is natural that the latter will dominate, and the macroeconomic and redistributive functions will need to be adapted effectively in order to accommodate—to some extent this has been true of Indonesia as well as Iraq [Ahmad (forthcoming)]. In Bolivia, in late 2007, hydrocarbon tax transfers to regions were cut by 60 percent, in a recentralisation move designed to facilitate "redistribution" transfers to poorer municipalities. It was also an attempt to "reassert" control over the regions with separatist tendencies [Fedelino and Ter-Minassian (2010)]. Such a move would be inconceivable in modern day Iraq or Indonesia, and would certainly fan rather than reduce secessionist tendencies in these countries—showing that there may not be a unique solution to the sharing of natural resource revenues, and much depends on the specific context, which may change over time.

Overall, despite the limited success to date with the decentralisation in Bolivia, the attempt has been to seek way to make it work better in a heterogeneous country, giving voice to the disadvantaged people who saw little benefit during extended periods of centralised rule. As shown by Faguet (2004), clearly the possibility of improvements in living standards has been demonstrated, even if this cannot be generalised at this stage (2009). Thus, going back to centralised rule is not a political-economy option, and the focus, has to be to examine the missing elements to make the process work better, particularly the own-source revenues at lower levels to enhance incentives for better accountability, and information flows that bolster the process.

Peru

As argued in Ahmad and García-Escribano (2010), Peru provides a laboratory for examining the effectiveness of decentralisation and the centralised rule, as successive administrations have oscillated between the extremes. Mayors were popularly elected prior to the period of military rule between 1968 and 1979. The subsequent period of extreme centralisation was characterised by increasing disparities between the coast (particularly Lima) and the poorer regions of the *sierra* and *selva*. The 1979 constitutional reforms reinstated municipalities. However, the attempts to decentralise functions during the first García period in the 1980s were hampered by weak administrative and economic management, and plagued by extensive rent seeking and diversion of resources at all levels of government. Combined with the chaos associated with the macroeconomic crisis and hyperinflation, there was little evidence of a reduction in regional disparities or poverty. In contrast, the stabilisation of Fujimori came with considerable centralisation, buttressed by the introduction of a VAT, with a central tax administration (SUNAT). As an adjunct to the economic stabilisation, the early Fujimori period was characterised by an attempt to also provide for social stabilisation, seen as an essential element in the fight against the Shining Path (*Sendero)* guerrillas.

A key reform initiated by Fujimori was the establishment of SUNAT. After a period of hyperinflation, and the collapse of the tax/GDP ratio to under 8 percent and a hopelessly corrupt tax administration, Fujimori fired the tax administration and established SUNAT with some staff from the Central Bank, together with technical assistance from the IMF. A key element was the design and implementation of the VAT, which brought the tax/GDP ratio quickly above 12 percent, as well as social stabilisation with focused on "protecting" the poorest and most vulnerable. Centrally determined and financed programmes, such as FONCODES,[10] were the major source of activities for local governments. While these were, in principle, designed to reflect local priorities, there were few mechanisms to coordinate at the local or central levels, assess tradeoffs and establish priority spending. The centre lacked the full information to make allocations, and there often was a lack of clarity between the spending by specialised agencies like FONCODES and the operations of line ministries and local administrations. The deconcentrated local governments were relatively weak, and lacked own-source revenues, or clearly defined functions.

The Toledo administration in 2002 revived the decentralisation process. The second García administration in 2006 also decided to move forward this decentralisation process. There was a political-economy recognition that a dispersal of power among regional and local governments provides insurance against a centralised abuse of power and resources. Ahmad and García-Escribano (2010)[11] suggested that considerable work is needed to develop a coordinated approach to spending and revenue assignments to ensure better governance and accountability at all levels—given the political economy constraints in Peru. This also entails an improvement in information flows, and a redesign of transfer mechanisms that "equalise capabilities" without creating disincentives.

As in the Colombian (and Indonesian) contexts, decisions on sharing of the natural resource canons in Peru preceded the devolution of spending or other own-source revenue raising powers, *paripassu* creating issues relating to both macroeconomic stabilisation and inter-regional redistribution. But perhaps this is the price to be paid in terms of decentralising powers and functions in a multi-ethnic and diverse country.

China

In the early 1990s Chinese context of murky spending responsibilities (a lot of social spending was performed by state owned enterprises belonging to different levels of government) in a legal unitary state, with no central tax collection other than customs, the centre had no ability to administer taxation. The Chinese economic reforms of the 1980s had moved from a system of 100 percent profits taxation of largely state owned

[10]This was a fund for social stabilisation that provided financing for education, health and infrastructure needs at the municipal level. See Ehtisham Ahmad, Juan Amieva-Huerta, JL. Ruiz and Jerry Schiff, April 1994, Peru: *Pobreza, PoliticasPublicas y Gestion del GastoPublico*, IMF, FAD, and Ehtisham Ahmad, J. Amieva-Huerta, and Jim .J. Thomas, October 1994, Peru: *Pobreza: Mercado de Trabajo y PoliticasSociales*, IMF, FAD.

[11]Ehtisham Ahmad, Katherine Christopherson, Mercedes García-Escribano, Alicia Díaz-Zurro, and Carlos Parente, 2005, Peru: *Modernising Budget Processes, Institutions and Information Systems*, FAD, IMF; and Ehtisham Ahmad and Mercedes García-Escribano (2010) Constraints to Effective Fiscal Decentralisation in Peru (forthcoming) In Jorge Martinez-Vaszquez and François Vaillancourt (eds.) *Obstacles to Decentralisation: Lessons from Selected Countries*.

enterprises (collected by local governments on behalf of the centre) to a more moderate level of taxation. However, this had the consequence that the tax to GDP ratio fell from more than 22 percent to about 12 percent by 1993, and more alarmingly, the central government share of collections fell from just under 60 percent in the early 1980s, to under 30 percent by 1993. This severely constrained the centre in pursuing macroeconomic and redistributive policy goals.

The debate at the time was whether the normative model of federal reforms should be followed: clarify spending responsibilities, and then adjust tax assignments accordingly—this was the "big bang" model (as in Russia). Alternative approaches[12] at the time supported a view from the Chinese administration that it would be preferable to bolster central finances with the establishment of a State Administration of Taxation (for the first time in Chinese history), responsible for the collection of modern taxes, particularly the VAT. This view was accepted by the leadership, which was keen to avoid the difficulties that were apparent by then in Russia following the collapse of the Soviet Union—another example of international yardstick competition.

The new tax system operated immediately from 1994, and the spending assignments were to be addressed over time as the SOEs were reformed gradually [see Ahmad, *et al*. (1994); Ahmad, Qiang, and Tanzi (1995) and Ahmad, Li, and Richardson (2002)].[13] The VAT reforms in particular, were spectacularly successful, raising the central government share immediately, and helping to bring the tax/GDP ratio up towards 20 percent of GDP. The interests of the local governments in the tax reforms were protected by a "stop-loss" provision that ensured that all local governments would get the amounts that they received in 1993, and the new system would be phased in.

A new equalisation transfer system was established similar to the most advanced in the world [Ahmad, *et al*. (1994) and Ahmad (1997)], but its operations were phased in over time, and a declining "revenue transfers" system was constituted in order to protect the employment and growth potential of the coastal regions [Lou Jiwei (1997)]. Reforms of the budget, treasury and reporting systems were also set in motion in the late 1990s, in a sequencing of measures to prepare for the operations of a modern economy. A second phase of the reforms is now needed, to clarify the spending responsibilities of the lower levels of government, and also examine own-source revenues and debt in a way to optimise land and local resource use.

The Chinese reforms during 1993-4 were an excellent example of the positive approach to intergovernmental issues in action, and the importance of a new tax administration as well as a non-distortive tax, such as the VAT. There was no concern that the VAT would either affect the poor or hurt investment or growth. In fact, the form of the VAT that was in operation for the first 15 years after implementation was the

[12]Ahmad, Ehtisham, GaoQiang and Vito Tanzi (1995) *Reforming China's Public Finances.* IMF, Washington, DC, and also published by MOF, PRC.

[13]Ahmad, E. and K-Y Lee and A. Kennedy (1993) *The Reform of Intergovernmental Fiscal Relations, Macroeconomic Management, and Budget Laws;* IMF: FAD, Ahmad, E., G. Qiang and V. Tanzi (1995) Ahmad, E., J. Craig, D. Mihaljek (1994) *China: on the Determination of a Grants System*, FAD, IMF, and Ahmad, E., J. Craig and R. Searle (1994) *China: Formulating and Estimating Grants*, FAD, IMF, Ahmad, Ehtisham (1997) *Financing Decentralised Expenditures,* Edward Elgar, and Lou Jiwei (1997) Constraints in Reforming the Transfer System in China. In Ahmad (1997); and Ahmad, E., H. Brixi, M. Fortuna, B. Lockwood and R. Singh (2003) *China: Reforming Fiscal Relations between Different Levels of Government*, FAD, IMF.

"investment" type VAT that does not provide credits or refunds for capital purchases—this did not, however, seem to affect either investment or growth, that have been spectacularly high during this period. The move to a more normal consumption-type VAT was only initiated recently.

Federal Countries

The return to democratic and multiparty rule in the federal countries was complicated by the multilevel government structures, especially in Brazil. Despite many difficulties and challenges (faced in common with Argentina and Mexico, including the international economic crises, as well as the periodic difficulties with sub-national debt) the Brazilians implemented some essential institutional reforms, including robust information management systems, that have stood them well over the years, including with the implementation of the Fiscal Stabilisation Pacts. These have been harder to replicate in Argentina, Mexico or Peru, or Russia for that matter, with the consequence that these countries remain much weaker than Brazil in managing crises involving subnational governments.

As in the unitary states, the centralising effects of implementing a VAT (the Brazilian VAT is an exception)[14] have been accompanied by the suppression of subnational own-taxes. This goes against the spirit of the democratisation reforms, and has been partially offset by an effort to establish greater spending autonomy by lower levels of government. But without major own-source revenues at the margin, this has tended to be with rather less accountability than ideal, laying the seeds for future sub-national crises. This process is complicated with the legacy systems of extensive earmarking, and overriding of local preferences, especially though not exclusively in Brazil.

Ironically, the centralising effect of the conditional cash transfers, especially Oportunidades and the Bolsa Família, which in the Brazilian case supplanted state level programmes has gone in the opposite direction. Ironically, the conditional cash transfers have been strongly supported by the World Bank,[15] which also has been one of the agencies most in favour of decentralisation—especially in terms of the effectiveness of service delivery as well as claims that it might reduce corruption.[16] It appears that the overlapping system of responsibilities has helped in facilitating the greater central role in social protection, and a case could be made to justify centralisation of this function. But, as the actions relating to conditional cash transfers involve both primary health care and education, the case becomes quite complex. That said, the role of the international agencies in influencing policy in the large federal countries in Latin America, or India, must be open to question.[17]

[14]The Brazilian VAT, which is composed of a federal and lower government level VATs, is no role model, leading to production distortions and evasion possibilities, and successive administrations have been trying to reform it without success over the past ten years.

[15]See Fiszbein, Ariel and Norbert Schady (2009) *Conditional Cash Transfers—Reducing Present and Future Poverty*. The World Bank.

[16]See Gurgur, Tugrul and Anwar Shah (2001) Localisation and Corruption: Panacea or Pandora's Box? In Ahmad and Tanzi (2001).

[17]Large federal countries such as Pakistan, which have been recipients of significant World Bank assistance over the years, have also tended to do what they want to, and have selectively used or distorted Bank advice to further parochial goals.

We examine the contrasting cases of federal countries, Brazil and Mexico, in this section, followed by a discussion relating to Pakistan.

Brazil

As in Peru, Brazil has oscillated between centralisation and decentralisation over time. However, the 1988 Constitution moved the country firmly towards greater decentralisation, with states and municipalities getting effective controls over major revenue bases and an increasing share of centrally collected revenues, as well as greater controls over expenditure management and access to credit, including through banks owned by the subnational governments. All this occurred within the typical Latin American context of overlapping spending responsibilities [Afonso and de Mello (2001)].[18] These contributed to an inevitable financial and macroeconomic crisis that had to be dealt with in a coordinated manner. In this section we describe some of the key elements that have "rescued" and strengthened Brazilian federalism, although deep-seated problems remain and need to be addressed within a "positive" or "political economy" context.

The 1988 Constitution introduced a multi-level VAT, with states having access to control over rates and base (including setting of exemptions) of a broad based high yield VAT (ICMS), the federal VAT base was limited to industrial goods, and municipalities were assigned a sales tax on municipal transport and property. This disjointed VAT assignment has been criticised as creating distortions, impeding inter-state trade,[19] and opening up evasion (also known as "invoice tourism"). Proposals to move towards a Canadian-style dual VAT, among others, have been on the anvil for at least 10 years, but it has proved quite difficult to introduce a change that involves states that are controlled by different parties making coordinated reforms. However, the strength of the current arrangement is that sub-national governments have control over a major tax base at the margin—this makes it feasible to impose hard-budget constraints on the sub-national governments, as no bailout provisions then become credible.

Although a larger share of federal revenues was to be transferred to the subnational governments, this was largely earmarked, accentuating the overlapping rigidities in the Brazilian assignments. It also reduced the scope for the federal government in making macro-adjustments—as the revenue effort needed for a specified level of adjustment increases proportionately (as it is not evident that the lower levels of government would agree to make the same level of adjustment as needed by the federation). Because of the sharing arrangements, the federal government has resorted to raising revenues that are not shared with lower levels—such as payroll and turnover taxes that encourage the development of informal labour markets and negatively affect competitiveness [Afonso and de Mello (2001)]. This pattern effectively replicates the Mexican pattern of financing sources for an increasingly important federal conditional cash transfer programme (the Bolsa Família, that is modeled on the Oportunidades programme—see below).

In addition to the control over own-revenues at the State level, the second major structural advantage that Brazil has over other Latin Federations is that it has an effective

[18]See Afonso, José Roberto and Luiz de Mello (2001) Brazil: An Evolving Federation. In Ahmad and Tanzi (2001), *op cit.*

[19]See Tanzi (2010).

mechanism to monitor spending at federal and subnational levels. This is through the GFMIS (SIAFI) that was introduced soon after the Constitutional change, along with an effective Treasury Single Account. This tracking of spending, together with credible sanctions that are facilitated by own-source subnational revenues, has made it possible to address sub-national debt problems in a coordinated manner.

Despite the increasing share in federal revenues following the new constitution, imbalances at the sub-national level appeared quickly, aided no doubt by the unclear spending responsibilities. Captive lending by banks owned by state governments added to the problems, as many subnational governments financed their deficits by borrowing from their state banks, in a period of high inflation, in anticipation of federal bailouts. Although the states and municipal governments had a small operational surplus at the start of the decentralisation process (0.7 percent of GDP in 1991), consistently high deficits in the following years led to a tripling of the stock of subnational debt through the decade (to over 21 percent of GDP by the late 1990s). Federal assumption of the subnational debt was accompanied by the agreement leading to the Fiscal Responsibility Law (FRL), and restoration of hard budget constraints at the sub-national level. This also involved elimination of borrowing from and privatisation of state-owned banks, and strictly enforced restrictions on additional borrowing, including imposition of ceilings for borrowing for investment (the "golden rule").[20]

The success of the FRL in Brazil has led to an "international yardstick competition" response by international agencies to replicate this in other countries, including in Latin America, as well as in countries like Pakistan and Nigeria. In the absence of the basic preconditions, including subnational own-source revenues, and full information flows on sub-national operations, the success of Brazil has not been so easily replicated, as seen in the Bolivia and Pakistan contexts.

International agencies have tried to replicate some Brazilian (and Mexican, see below) success stories in the area of social protection—particularly conditional cash transfers. In the post decentralised world, prosperous states blocked federal spending in poorer states for fear of losing federal funds. This shifted the focus to poor areas within states, so that poor areas in rich states would benefit from greater financing than poorer areas in poor states, accentuating overall inequalities. However, given the overlapping responsibilities on the spending side, the federal government was able to enter into joint ventures in the social area, including preventive health care, primary and secondary education and income support. Since 2003, during the period of the Lula administration, the federal and subnational initiatives have been rolled into the Bolsa Família.[21] In effect, overlapping and ineffective social benefit programmes at the subnational level have been rolled into a federal programme. While this addresses the issue of uniformity of treatment across the country—a deficiency pointed out by Afonso and de Mello (2001) it comes at the cost of a recentralisation effort in areas of basic subnational competence and responsibility.

While Brazil appropriately learnt from the Mexican example with Oportunidades, it is not clear that this was specifically recommended by the international agencies (although both

[20]For details of the FRL, see Afonso and de Mello (2001).

[21]This includes the *Bolsa Escola*, that supplanted several municipal programmes, *Bolsa Alimentação, AuxílioGás, CartaoAlimentação* and the cash transfer component of *Programa de Eridacação do TrabalhoInfantil.* See http://www.mds.gov.br/bolsafamilia.

the World Bank and the IMF are now instrumental in spreading the gospel concerning Oportunidades type conditional cash transfers).[22] The critique of the effective financing arrangements for the Oportunidades programme (see below) will also apply to theBolsa Família. A reform of the financing arrangement remains contingent on the political economy constraints will involve the VAT and revenue-sharing arrangements, and will involve not just the tax reforms but also the redesign of equalisation and earmarked transfers.

Mexico

In the Mexican context, the underpinnings of the decentralisation reforms were not as strong as in Brazil. This involved centralisation on the revenue side involving the VAT, and inadequate information systems to monitor and evaluate spending at the federal and subnational levels. The subnational debt crises in Mexico also affected macroeconomic stability, as in Brazil, but did not lead to the same level of institutional reforms as in the Brazilian case.

The Mexican introduction of the VAT led to the removal of 30 federal excises and turnover taxes as well as 300+ state and local taxes [Gil Diaz (1987)].[23] As in Argentina and Brazil, the tax reforms were accompanied by the introduction of (fairly complicated and non-transparent revenue sharing mechanisms. The loss of effective controls over revenues at the margin from the states was not appreciated in terms of policy or theory, and remains problematic in terms of the accountability of subnational governments. Gil Diaz noted early on that the formula for sharing should be revised so that it "does not pit states against each other, the formula must be one that does not generate a pie that must be divided so that somebody's gain is someone else's loss.[24] However, the greater reliance on shared revenues had the effect of "sharing up a pie" and the ensuing inter-state conflict began to be reflected almost immediately in a tussle over relative shares. Gil Diaz also noted the reduced incentives for state governments to maintain efficient tax administrations. In a sense, although the political economy literature of fiscal federalism had not gained much currency, policy-makers were often quite aware of the political economy consequences of their actions.

The Mexican VAT was also problematic in its inadequate revenue-raising aspect, as it tried to meet distributional objectives through a series of exemptions and zero-ratings, as well as lower rates for border regions (some which occurred several hundred miles away from any border. This impacted on its efficiency, resulting in one of the worst VATs in Latin America. However, when Gil Diaz became Secretary of Hacienda in the late 1990s (in the Fox Administration), he was unable to reform the VAT, given the interlocking set of vested interests in the exemptions and zero-ratings, as well as those resulting from the design of the revenue-sharing system. At this stage, it became clear that the reform of the VAT is effectively an exercise in intergovernmental political economy, especially as one party PRI-dominated rule was replaced by a multi-party arrangement with PRI in the opposition and different parties controlling different states.

In the Mexican context, overlapping responsibilities further obfuscated responsibilities, and this was exacerbated by the economic crisis in the mid-1990s, where borrowing by state investment projects, without federal guarantees, led to a worsening of

[22]The World Bank case for conditional cash transfers is nicely put inFiszbein and Shady, 2009, and that of the IMF in Fedelino and Ter-Minassian, 2010, who claim this to be an example of international best practice, p. 85.

[23]Gil Diaz, F. (1987) Some Lessons from Mexico's Tax Reforms. In DMG Newbery and NH Stern, *The Theory of Taxation for Developing Countries.* Oxford University Press for the World Bank.

[24]Gil Diaz, F., *op cit*., p. 348.

a banking crisis, precipitating the need for a federal bailout. Subnational debt limits were imposed, but the absence of a standardised budgeting and reporting framework at all levels of government remains a major constraint.

Institutional arrangements remain weak. In 1996, Mexico tried to introduce a Brazilian style GMIS (SIAF). The design also called for a TSA. By 2001, the system had failed, and even to this day after considerable additional support from the IMF and the World Bank, a proper GFMIS has not been implemented at the Federal level. The Treasury reforms appear to have been abandoned and along with this the likelihood of achieving the standardisation of information flows and controls needed for effective management (in the Brazilian mode). It is clear that there is significant opposition to the greater clarity that comes about with the Brazilian expenditure management model, and successive Mexican Finance Ministers since 1996 have tried but failed to implement this basic reform.

Ahmad, *et al.* (2007a) had stressed the importance of political economy considerations in suggesting greater clarity on the spending assignments, as well as tangible own-source revenue handle for the states. Following the Chinese example, they stressed that any tax reform that impacted on state transfers would have to indemnify the states from losses, and provide them with a share in the benefits to ensure political support for the reforms. A proposal for a dual VAT, or an IRAP-style state tax handle, was to have been accompanied by a reform of the revenue sharing and simplification of the transfer system. However, the government was more interested in bolstering federal revenues, and used the intuition of Ahmad, *et al.* (2007a) to introduce a federal *ImpuestoEmpresarial a TasaUnica* (IETU), at the same time simplifying and adjusting federal revenue shares to ensure that no state lost revenues from the reform. This subnational stop-loss provision was critical in the Chinese 1994 tax reforms, and was effectively copied by Mexico in 2007. However, the subnational tax handles and intergovernmental reforms agenda remain substantially unaddressed.

An effective cash transfer system, *Oportunidades* (initially called *Progresa*) was introduced to replace tortilla and gas subsidies. It is a federal programme linked to nutritional, educational and health care outcomes, has been reportedly very successful (Coady and Parker, 2002)[25], and has been the basis for the World Bank's strong advocacy of such programmes in Latin America and elsewhere [Fiszbein and Schady (2009), *op cit*]. However, this programme is financed by a distorting payroll tax [Levy (2008)],[26] given the problems that the federal government has in raising general revenues with the "holes" in the VAT and the income taxes. In an economy rife with evasion and avoidance, and the presence of informal labour markets, Oportunidades reinforces incentives for greater informality. Also the size of the benefit has risen over time, as successive ministers have sought to put compensatory measures for all sorts of interventions on top of this scheme. Finally, state governments are aggrieved as they see this programme as cutting across their areas of responsibility in education and health care—further obfuscating the overlapping and murky spending responsibilities. Thus, there are a number of contradictions that need to be addressed in order to ensure that the programme continues to provide effective social assistance in a sustainable manner that does not distort incentives and limit growth potential.

[25]Coady, David, and Susan Parker (2002) A Cost Effectiveness Analysis of Demand and Supply-side Education Interventions: The Case of PROGRESA in Mexico. (IFPRI Discussion Paper 127).

[26]Levy, Santiago (2008) *Good Intentions, Bad Outcomes: Social Policy, Informality and Economic Growth in Mexico*. The Brookings Institutions.

What is the Evidence on Decentralisation?

The evidence on the effects of decentralisation regarding improvements in service delivery in the OECD countries is mixed, as reviewed by Ahmad, Brosio, and Tanzi (2008). And, the evidence for developing countries is not much more conclusive, as reviewed in Ahmad and Brosio (2009)—see Table 2. The links between decentralisation

Table 2

Decentralisation: Preference Matching and Growth—Summary of Selected Papers

Author(s)	Countries of Reference	Period of Reference	Fiscal Variables of Reference	Growth Variables of Reference	Decentralisation Index	Main Results
Akai and Sakata	US counties	1993-2000		GDP growth rate	Fiscal with emphasis on tax autonomy	Growth is positively related to tax autonomy and specifically to non-bailouts
Arze del Granado MartinezVasquez and Mc Nab	45 countries developed and developing countries	1973-2000	Ratio of educa-tion and health expenditures to total public expenditures		Fiscal decentralisation	Likely increase of expenditure for health and education
Ebeland Yilmaz	19 OECD countries	1997-99	Public sector's expenditure share of GDP	GDP growth rate		
Faguet	Bolivia Sample of municipalities	1991-1996	Investment for Education; Water and Sanitation; Watershed Management		Fiscal decentralisation	Increased spending in poorer areas
Faguet and Sanchez	Bolivia and Colombia. Samples of municipalities	Mid 1990s earlies 2000s.	Investment in education		Fiscal decentralisation	Increased spending for education and expanded enrolments
Jin and Zou	17 industrial and 15 developing countries	1980-1994	Subnational, national, and aggregate government size: the ratio of total expenditure at corresponding level to GDP		Fiscal and regulatory decentralisation	Increase of subnational expenditure and reduction of national expenditure
Solé-Ollé and Esteller-Moré	Spain	1977-1998 (44 provinces)	Investment road and education		Fiscal and regulatory decentralisation	Better adaptation of investment to local needs
Thiessen (2000)	26 mainly developed countries	1975-1995	Annual growth rate of real gross fixed capital formation (as indicator of physical investment)	Growth rate of per capita GDP Total factor productivity growth	Fiscal decentralisation	Growth initially increases but then declines with decentrali-sation
Thiessen (2003)	14 and 21 high-income OECD countries	1973-1998	Average annual investment share in GDP	Log difference GDP per working-age person Average annual total factor productivity growth	Fiscal decentralisation	Growth initially increases but then declines with decentrali-sation

Source: Ahmad and Brosio (2009).

and preference matching and with growth are often examined together. The studies confirm that any relationship, if it can be established, is at best weak and tenuous.

Perhaps the greatest lacuna in the decentralisation processes of developing countries, especially in Latin America (with the exception of Brazil), is the lack of sufficient action on adequate own-source revenues at the sub-national level. This may have been due to the normative approaches that suggest focusing first on the spending side, especially at the intermediate tier of government/ states/provinces/departments. The same pattern is observed from Indonesia to Pakistan.

4. CHALLENGES FOR PAKISTAN

In the 1960s, the administration of Field Marshal Ayub Khan had experimented with a system of basic democracies—setting up an electoral college at the local level that also formed the basis of development activities in their regions. This effort at political "deconcentration" was abolished under the 1973 Constitution that restored the rights and functions of the provinces—that had been the main sub-national unit of governance under the 1935 Government of India Act, and had formed the basis for the Constitutions in both India and Pakistan after independence.

The Musharraf administration promoted a form of so called "decentralisation" in the post 9/11 period. While this was ostensibly a mechanism to get services closer to the people, and elected local officials, there was little attempt to adjust the spending assignments or financing arrangements, as in Indonesia (see above). While the process was clearly an attempt to by-pass the established political parties and the power centers in the provinces, the bilateral donors and multilateral banks rushed to support the process, along with the institutional reforms of the Federal Bureau of Revenue, and the government financial information systems (GFMISs) at all levels of government. Each of these reforms had failed, or was in significant difficulty, by the time that Musharraf left office in 2008.

Tax Reforms

The reform of the tax administration has been recognised as a priority since the early 1980s, and the Report of the Tax Reforms Commission headed by Qamar-ul Islam that called the then Central Board of Revenue as a hotbed of corruption and rent seeking. The GST that was introduced in 1990 under an IMF supported programme (but brought in through the back door, when the entire sales tax act was replaced as part of the finance bill). It was administered in a very arbitrary manner, with the tax administration treating it like a production excise [Ahmad (2010)], setting reference prices and continuing to give exemptions and preferences through a system of administrative orders (SROs) that provided ample opportunities for a continuation of the rent-seeking and corrupt practices that bothered the Qamar-ul Islam Committee in 1983. However, the ability to give preferences and exemptions and reward specific groups, and threaten to punish others without reference to Parliament, gave convenient handles to politicians of successive weak administrations to make friends and influence people. At the end of the 1990s, a committee led by former World Bank official, Shahid Husain, recommended the creation of an integrated revenue administration, using the modern principles of self assessment, arms' length functional administration with minimal contact with taxpayers, and

consequently limited opportunities for rent seeking. This was supported by a large World Bank loan to create the new Federal Board of Revenue (FBR) on the Argentine Revenue Authority model. By the spring of 2008, the World Bank had classified the project as "unsatisfactory". The functional organisation structure had not been created, an IT system was prepared in-house largely automating the old procedures, key productive structures had been taken out of the GST net (with domestic zero-rating, largely to offset delays in refunds and the pressures on these sectors from an overvalued exchange rate in a manner that would not attract attention from the WTO). In order to appear "investor friendly", the audit system had been effectively abandoned in 2004-5. It is no wonder that the GST failed to raise revenues, as had been expected under the strategy to replace tariffs by the GST (the plan had been to replicate the Singapore strategy that had very effectively used this method).

The Pakistan efficiency of the GST by 2009 had declined to around .26 (as measured by the C-efficiency ratio, [see Ahmad (2010) for more details], and the collection had declined to 3.1 percent of GDP, down from 3.9 percent in the 1990s (see Table 3). If Pakistan were to achieve a C-efficiency of Sri Lanka (from around 2004 at the height of the civil war), it would more than double the collection, or get to around 7 percent of GDP with a 15 percent rate. It is worth noting that the Chinese VAT generates around 9 percent of GDP, and still has some scope for increase, given that the local business tax has still to be folded into the VAT net [Ahmad (2008)].

The economic crisis of 2007-2008 led to a significant rise in the budget deficit and overall debts—leading to a haemorrhaging of record high reserves. A government stabilisation plan of September 2008 (see Table 4) was based on raising the tax/GDP ratio 5 percentage points, and formed the basis of the submission to the IMF. The argument was that the government needed roughly two years to revive and implement the Shahid Husain plan to restructure the FBR, and the IMF monies would be a "bridging loan" while this reform took effect.[27]

Table 3

GST Productivity—Declining and Low in Comparison with Competitors

	Standard Rate	Revenue/GDP	Productivity
Pakistan (1990s)	15		.39
Pakistan (2005)	15	3.4	.30
Pakistan (2009)	16	3.1	.26
Sri Lanka	15	6.7	.47
Philippines	12	4.3	.45
Turkey	18	7.1	.48
Lebanon	10	5.1	.50
Jordan	16	10.1	.62
Korea	10	5.7	.67
Singapore	5	1.8	.63
New Zealand	12.5	8.9	.93

[27]The former head of the Argentine Revenue Authority was hired by the World Bank, and prepared a plan to enable a reformed VAT to be implemented in a reformed FBR by summer 2010, the key date under the IMF programme [Silvani, Carlos, Edmund Biber, William Crandall, Wyatt Grant, Orlando Reos and Geoff Seymour (2008) *Pakistan: A Tax Administration Review.* The World Bank].

Table 4

Pakistan: Medium-term Fiscal Operations 2008–2013

(Rs Billion)

	Budget	Projections				
	2008-09	2008-09	2009-10	2010-11	2011-12	2012-13
Total Revenue	1809	1954	2507	3058	3670	4384
Tax Revenue	1308	1378	1841	2326	2886	3531
Federal	1251	1319	1777	2253	2802	3436
of which: FBR	1250	1319	1777	2253	2802	3436
Provincial	57	59	64	74	84	95
Non-tax Revenue	501	576	667	731	784	853
Federal	411	481	544	591	622	668
Provincial	90	95	122	141	162	185
Total Expenditure	2391	2536	3153	3730	4319	5010
Current Expenditure	1919	2115	2545	2917	3308	3745
Federal	1402	1598	1905	2179	2465	2791
Interest Payments	523	618	752	849	948	1074
Others	879	980	1152	1329	1517	1718
Provincial	517	517	640	738	843	954
Development and Net Lending	472	421	608	812	1011	1264
Federal	322	271	368	499	611	740
Provincial	150	150	240	314	400	525
Budget Deficit	–582	–582	–646	–672	–649	–625
% of GDP (mp)	–4.7%	–4.3%	–4.0%	–3.6%	–3.1%	–2.6%
GDP (mp)	12280	13493	16008	18494	21077	23675
Total Revenue	14.7%	14.5%	15.7%	16.5%	17.4%	18.5%
Tax Revenue	10.7%	10.2%	11.5%	12.5%	13.7%	14.9%
Federal	10.2%	9.8%	11.1%	12.2%	13.3%	14.5%
of which: FBR	10.2%	9.8%	11.1%	12.2%	13.3%	14.5%
Provincial	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%
Non-tax Revenue	4.1%	4.3%	4.2%	4.0%	3.7%	3.6%
Federal	3.3%	3.6%	3.4%	3.2%	3.0%	2.8%
Provincial	0.7%	0.7%	0.8%	0.8%	0.8%	0.8%
Total Expenditure	19.5%	18.8%	19.7%	20.2%	20.5%	21.2%
Current Expenditure	15.6%	15.7%	15.9%	15.8%	15.7%	15.8%
Federal	11.4%	11.8%	11.9%	11.8%	11.7%	11.8%
Interest Payments	4.3%	4.5%	4.7%	4.6%	4.5%	4.5%
Others	7.2%	7.3%	7.2%	7.2%	7.2%	7.3%
Provincial	4.2%	3.8%	4.0%	4.0%	4.0%	4.0%
Development and Net Lending	3.8%	3.1%	3.8%	4.4%	4.8%	5.3%
Federal	2.6%	2.0%	2.3%	2.7%	2.9%	3.1%
Provincial	1.2%	1.1%	1.5%	1.7%	1.9%	2.2%
Budget Deficit	–4.7%	–4.3%	–4.0%	–3.6%	–3.1%	–2.6%

Source: Government of Pakistan. Economic Stabilisation Plan. *Reinvigorating Hope and Ameliorating Peoples.* Livelihoods, Islamabad, September 2008.

The revised VAT law was meant to remove the distortions in the GST—especially the domestic zero-rating and exemptions that were largely designed to benefit special interest groups, and *paripassu*, consumers of luxury textiles and oriental carpets. The other main objective had been to create the basis for an arms' length tax administration based on self-assessment and effective audit, minimising the problems of direct contact between the tax administration and taxpayers, and also the difficulties with the issue of

refunds that had created considerable rent seeking. A critical additional objective was to remove the ability of the tax administration to confer benefits on the chosen few through the notorious SRO system, and the new law required any such change to be submitted to Parliament and that the FBR would be stripped of this power. Finally, given that the GST law had been brought in through the back door and was full of "holes", and the newly elected Parliament had warned the Government that no significant fiscal reform should be sneaked in again through finance bill, it was decided that a new law on the VAT should be submitted to Parliament.

The "streamlined" VAT law which would also have replaced multiple rates (from 17 to 26 percent) and cascading associated with reference prices, by a single rate and considerable simplicity, including elimination of SROs, was badly sold to the public and the parliament. This was partly due to the opposition from the vested interest groups that had benefited from the holes in the GST, and partly due to reluctance on the part of the tax administration to relinquish its "rent seeking powers" and the loss of the SRO handles. Although a corrupted version of the VAT bill (retaining some draconian powers for FBR) was passed by the Senate, there was enough opposition to the bill in the lower house to stall it on the absurd grounds that it would "crush the poor", without empirical or analytical support. In reality, the poor would be largely unaffected by the GST, but will surely crushed by the resort to deficit financing and borrowing from the banking system that would surely result, and indeed this has occurred.

In order to "rescue the IMF programme", the government proposed a Plan B in March 2011, to remove the main "exemptions" under the GST, but without the full overhaul of the law. This was to remove by administrative order the SROs that had led to the exemptions. This option faced no legal difficulty. However, this would not have raised much additional revenue, and may even have led to less revenue in the short run, but would clearly indicate the seriousness of the authorities to tackle vested interests. This reform lasted less than a fortnight, as the vested interests coalesced, and the proposals were replaced with a far worse situation with the SRO283, issued on April 1, 2011.

SRO 283 provided all sorts of exemptions and lower rates to all manner of final and intermediate goods—184 items in all, and recreated "cascading" that is the antithesis of a GST. Finally, item 185 stipulated that any other exemptions that might be needed in the future would be included without having to issue an additional SRO—this is SRO making ad absurdum. More problematic is that the FBR effectively reversed the logic of the functional tax administration by inserting audit in the regional offices, giving immense power to tax assessors that now also have access to information from the database of the National Database Registration Agency (NADRA). Without adequate safeguards, there will be enhanced scope for rent seeking in a reinvigorated administration reliant on the SRO culture.

From the perspective of repaying the IMF, any action on the GST now is too late, raising the specter of reliance on taxes that are less investment and growth-friendly, or inflationary credit expansion and continued borrowing from the banking system crowding out the private sector.

Decentralisation

The story on decentralisation is more hopeful in some respects, yet suffers equally by the failure on tax reforms.

The newly elected Parliament pushed through a reform of the Constitution, with the 18th Amendment during 2010. This eliminated the concurrent lists of the Constitution, giving provinces sole powers in a number of areas, including health and education. This reform was preceded by the award of the National Finance Commission that increased the provincial share in federally collected revenues, predicated on an increase in the tax/GDP ratio given the proposed reform of the GST and other taxes. The 18th Amendment reiterated the right of the provinces to administer the GST on services, if they so desired—the revenues belong to the provinces in any case.

The split base of the GST relating to goods and services is unique to the sub-continent, and had its origins in the 1935 Government of India Act that assigned the sales tax on goods to the states/provinces. After independence, the goods part was taken over the Federal Government in Pakistan, and the more difficult element on services was left to the jurisdiction of the provinces, reiterated in the 1973 Constitution. As there was no GST or VAT at that time, the complexity of this assignment was not realised. Thus, Pakistan finds itself in a unique position as being the only country in the world trying to implement a GST on services at the sub-national level, without the administrative machinery to do so. Even if it had the administrative machinery, this would be a herculean task.

A cooperative solution would have been to permit the FBR (or a new administration on the Peru model, serving all levels of government) to collect an integrated GST for the federation and all provinces, close loopholes and deliver a larger pie to the provinces directly, as well as through the common divisible pool. After all, this was the basis of the NFC award. However, one province rejected the proposal. A complex alternative mechanism was designed to get around this difficulty, with the current FBR effectively operating the crediting and refund mechanisms associated with the GST—the only agency capable of doing so. But, as discussed above, vested interests opposed fixing the loopholes in the GST. This risks an untenable situation in which there will be insufficient financing available for the devolved functions, and will result in unfunded mandates. This could trigger a significant backlash against the devolution process.

The speed at which the spending functions were devolved meant that there was inadequate attention given to the role of "subsidiarity", the role of regulations, as well as coordination of functions that have associated externalities, such as primary health care, university education, climate change and environment and natural disasters. In addition, more work is needed on the effective service delivery aspects at the local levels, and the possible inadequacy of local incentives in providing for the most vulnerable—e.g., the aged without extended family support, single women, and minorities. This could lead to significant miscarriages of justice and equity in the future.

A more fundamental problem lies in the absence of effective own-source revenues at the provincial or local levels. As seen in the Latin American and East Asian cases, this is the Achilles'' heel of the devolution process in many countries, leading to a loss of accountability and responsibility for local service delivery. A share in the divisible pool,

or the unstable assignment of the GST on services do not count as effective own-source revenues.

Clearly, significant additional work is needed to make the 18th Amendment work without unravelling the Federation.

5. ALLAMA IQBAL AND MAKING THE FEDERAL STRUCTURE WORK IN PAKISTAN

The devolution process that has begun with the 18th Amendment presents a great opportunity to change the way that public policy is formulated in Pakistan, and hopefully to make it more responsive to the needs and desires of the population. However, if the GST reforms do not succeed, given the vociferous opposition by the vested interests who have benefited by exemptions and zero rating at this point in time,[28] the entire devolution process would run into trouble, as would the current NFC award. This seriously risks the implosion of the existing intergovernmental fiscal system. Indeed the GST itself has ironically been made out to be the most "hated" tax—by the very groups that should welcome the removal of distortions and the creation of a level playing field.

But the intergovernmental reform may be able to muddle along, even given the lack of attention given to the revenue assignment issue. At the outset, the ideal-type single an integrated VAT, and cooperative and simple revenue-sharing arrangement described by Dr Tanzi in his distinguished lecture [Tanzi (2010)] is just not feasible in the Pakistan context, nor in most complex and multi-level federations. However, as Ahmad (2010) has shown, the patchwork needed to make the Constitutional assignment to provinces of the services base under the GST is not stable, can be blocked by any one province in isolation, and could generate tax wars between provinces. This will necessitate innovative solutions, that are more stable, but which provide provinces with significant tax handles that are needed for greater accountability for sub-national spending and fiscal arrangements.

Inevitably, the solutions may mirror the need to integrate the GST along the lines discussed in the context of the Indian Finance Commission, and recommendations for reforming the Brazilian system, involving "piggy-backing" or dual VAT arrangements. Such measures would need to be accompanied by an equalisation framework for the poorer provinces in order to reduce the disincentives and distortions that are inherent in the current revenue sharing and transfer design mechanisms. This would represent a significant research agenda that could usefully be followed by policy/research teams in preparation for the next Finance Commission.

Perspectives of Allama Iqbal

Allama Iqbal would have been appalled by the display of "khudī" in Pakistan over the past three years since the restoration of the "democratic process" and the economic crisis. Unfortunately, the khudi on display is more akin to the narrow and parochial

[28]This has been couched in "populist" terms as affecting the interests of the poor—whereas in fact a properly functioning tax system would reduce the government's borrowing requirements and the current inflationary pressures. It is also unlikely that relative prices would change adversely for the poor with the removal of these extraordinary benefits for the pampered sectors and a downward revision and consolidation of the rate restructure of the GST.

calculus of politicians of all shades looking at their own selfish party interests at the cost of the country's short and long-term interests. In evidence also is the khudi of officials of the tax administration ready to sabotage any circumspection of their powers of influence, rent seeking and extortion. The khudi of Iqbal, representing shared national interest and identity is not much in evidence.

The inability or unwillingness to fulfil promises and assurances made to the international community in order to secure IMF and other multilateral and bilateral loans feeds into the stereotype of an unreliable polity and administration. The paralysis in the face of economic crisis, possible debt defaults and unsustainability of the fiscal stance is reflective of Iqbal's warning of a democratic process that cloaks domination in the garb of freedom, but binds the dispossessed even further—effectively representing the death of national khudi (see Verses 2 and 3 above).

The likely centrifugal forces that could be unleashed by an unbalanced decentralisation process that is unfunded and that does not enhance service delivery, accountability and responsibility is an even greater danger—as again foreseen by Iqbal (Verses 1). One can only hope that the national motto of "unity, faith and discipline" is renewed in a time of extreme crisis, eschewing reliance on foreign assistance or milking geopolitical location to extract rents, thus breaking the "begging bowl" as had been claimed by Prime Minister Shaukat Aziz when the last IMF programme was terminated prematurely. Perhaps the cooperative spirit that led to the 18th Amendment will also result in a ray of hope to make it work, and for the "national khudi" to be rekindled. This is the ray of hope that Iqbal refers to in Verses 5 below.

Verses 5: A Ray of Hope?

- *Jānhaimohramasrārshud*
  - A new life has been breathed into the people
- *Khavarazkhābgarānbídārshúd*
  - Waking them from a deep sleep
- *Jazbehāitāzéouradādéand*
  - New aspirations have been given
- *Bandhaíkohnéhrabegushadéand*
  - Old chains have been broken

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The Mahbub ul Haq Memorial Lecture

Revenue Sharing Arrangements: Options and Relative Merits

VITO TANZI

I. THE INCREASING TREND TOWARD FISCAL DECENTRALISATION

The decades immediately after World War Two saw: (a) the spreading of ideas, rightly or wrongly attributed to John Maynard Keynes, that called for a larger government role in the economy; (b) the growing popularity of socialism; and (c) the creation of the United Nations, an event that gave a global voice to the citizens of low-income countries and that provided statistics that, for the first time pointed to the big differences in living standards that existed between the so-called "developed" or "advanced" countries and the "underdeveloped", or "developing" countries, and between the rich and the poor within specific countries.

Those decades witnessed a period of fast growth in the activities of governments and especially in those of the *central* governments. The central governments of many countries assumed increasingly important and wider roles and functions. See Tanzi (2011) forthcoming, and Tanzi (2008). The governments of many countries tried to raise their tax revenue to be able to increase public investment, to create needed infrastructure and to provide better social services, such as education, health, and social assistance, to their citizens. In those decades the importance and the revenue needs of national or central governments grew and the literature on "taxable capacity" became a popular branch of economics. Especially developing countries needed more government revenues and more taxes to be able to grow.

Somewhere around 1980s a reaction against this centralisation of economic and political power in the national governments started to take form, at first weakly and then progressively more forcefully. The centralisation of governmental activities began to be seen as having reduced the "voice" of many citizens and the power or importance of local (i.e., sub-national) governments or jurisdictions. With the passing of the years, a pro-decentralisation movement developed and acquired intensity and started to be embraced by some international organisations. It was assisted, especially in developing countries, by the movements toward more democratic governments.[1] This movement accompanied,

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[1]Data from the IMF *Government Finance Statistics* on richer countries show that in more recent years the shares of sub-national expenditure in percent of General Government Expenditures increased in many, but not all.

and to some extent competed with, the movement toward privatisation that was becoming important in many countries at about the same time.

When and where the focus of attention and action shifted, from the national government toward the sub-national governments, rather than toward privatisation, questions were raised about the fiscal arrangements that should or could be created in order to assign more fiscal resources and more fiscal responsibilities to the sub-national governments. In most countries there were no political constitutions that provided legal and political guidance as there was, for example, in the United States. The limited literature on fiscal federalism that had existed until the 1980s had been largely inspired by the special U.S. experience and by the writings of US based economists such as Oates, Tiebout, and Musgrave.

By 2010 a huge literature had become available that dealt with multi-level public resource assignments in many countries. In recent decades this literature grew in size and scope and attempted to develop principles or rules to determine what should be the fiscal responsibilities of sub-national governments and how their activities should be financed. That literature has gone well beyond the often-cited contributions by the above-mentioned economists.

In most federal countries there are three government tiers: the national (or central) governments, that are responsible for the whole countries; the governments that deal with large geographical areas within countries, usually referred to as *regional* governments. When the existence of these governments has preceded, historically, that of the national government, as in the United States and in Brazil, the (regional) governments are called "states".[2] Within the regions (or the "states") there are smaller political or administrative units that are the municipalities, the communes, or, in some countries, the counties. Municipal governments have of course existed for a very long time, perhaps for as long as there have been cities, at least 5000 years. In many cases they are many in numbers. For example, they are about 5,760 in Brazil and 8,000 in Italy.

In a few countries, such as Italy, there are also governments or administrative units between the regional and the municipal governments. They are called provinces and each of them deals with the area covered by a group of municipalities.[3] These provinces are financed by transfers from the higher tiers, or by shares in some national taxes. Many experts question the merit of their existence but it is politically difficult to eliminate them where they have existed.

Multi-tier governments, or fiscally decentralised administrations, exist in most large countries (China, Brazil, the Untied States, Russia, Canada, Australia, India, Indonesia, South Africa, Nigeria, Argentina, Pakistan, Germany) and even in some relatively small countries (Switzerland, Belgium, Denmark, Norway). In most countries municipalities have some degrees of political and financial autonomy.

In recent decades, there has been a growing willingness to give more political power, or more voice, to the subnational governments. One manifestation of this trend has been that of having direct elections for city mayors and for regional governors. This is a relatively recent phenomenon, as Table 1 indicates. In earlier years, the individuals

[2]In these countries regional governments, the "states", had at some point decided to "unite" and to create, and be part of, national governments, often defined as *federal* governments.

[3]In some countries the *provincial* governments *are* the same as the *regional* governments.

that occupied these positions were appointed rather than elected. Table 1, provides information on this development for the Latin American region. It has affected, especially, the municipal level, but is increasingly spreading to the regional level. The Latin American experience is, probably, fairly representative of this trend in other regions.

Table 1

Latin America: First Year for the Direct Election of Executive Positions In Sub-national Governments

Countries	City Mayors	Regional Governors
Argentina	1983	1983
Bahamas	1997	
Belize	1981	
Bolivia	1985	2005
Brazil	1982–85	1982
Chile	1992	
Colombia	1998	1991
Costa Rica	1949	
Ecuador	1983	1983
El Salvador	1985	
Guatemala	1985	
Guyana	1995	
Honduras	1981	
Jamaica	1962	
Mexico	1917	1917
Nicaragua	1992	
Panamá	1995	
Paraguay	1991	1993
Perú	1980	2002
Dominican Republic	1966	
Uruguay	2010	1984
Venezuela	1989	1989

Source: Rafael de la Cruz (2011), p. 47.

While the subnational governments are being given increasing authorities, political autonomy and, generally, more spending mandates and responsibilities, their *direct* access to fiscal resources has remained limited. Thus, the financial autonomy of sub-national governments has remained somewhat constrained.[4] Their resources continue to come mainly from less-productive taxes and from fees and transfers, often with strings attached, from the national government. Of course the more rigid are the strings, the less free they are to use the money they receive as they wish. At times, poor accounting, on the spending side, allows local governments to relax the power of the strings, in a *de*

[4]This is less so for municipalities. In several countries their access to loans has been prevented. However, delayed payments to suppliers creates implicit loans but also hidden debts that, occasionally, have led to difficulties.

facto, if not *de jure*, way. When this happens, poor accounting is often accompanied by accountability or corruption problems. In any case the scarcity of fiscal revenue for local governments has contributed to observations, on the part of some, that a "democratic deficit" has been created, because the delegation of political power to sub-national governments has not been accompanied by the assignment of equivalent financial resources. See OAS (2009, 2010). This has become a recurrent theme in the Latin American continent. The total tax resources collected in developing countries, or in emerging markets, are still somewhat limited in many of them. Thus it has been difficult for central governments, which also face spending pressures, to spare large portions of the resources that they get from taxes or from the ownership of mineral resources. Of course it could be argued that, at least some of them, should make a greater effort to raise their tax collection.

Table 2 provides some information, for developed countries and for Latin American countries, on the revenues (before and after transfers to sub-national governments) and on the expenditures (after the transfers) for the three government tiers. Unfortunately a similar table is not available for other parts of the world.

The importance of transfers is evident from the table. The resources transferred downward, from the national government to the sub-national governments, average about five percent of GDP, for both "developed" and Latin American countries. The table refers to averages for large groups of countries. It does not reflect the situation of specific countries that may differ significantly from the average. The table shows the continuing great predominance of national governments in both taxing and spending.

Table 2

Inter-governmental Finances in Groups of Countries

	Developed Countries Averages Revenues		Latin American Countries Averages Revenues	
	% of GDP	% of Total	% of GDP	% of Total
	Before Transfers		**Before Transfers**	
Public Sector	42.4	100.0	25.6	100.0
Central Government	27.8	65.6	20.9	81.6
Regions or States	9.0	21.2	3.4	13.3
Municipalities	5.5	13.0	1.3	5.1
	After Transfers		**After Transfers**	
Central Government	22.8	53.3	16.1	64.9
Regions or States	11.7	27.5	6.1	24.6
Municipalities	8.1	19.0	2.6	10.5
	Expenditures		**Expenditures**	
	% of GDP	% of Total	% of GDP	% of Total
Public Sector	47.8	100.0	27.9	100.0
Central government	27.2	56.9	18.4	65.9
Regions or States	12.6	26.4	6.9	24.7
Municipalities	8.0	16.7	2.6	9.3

Source: Rafael de la Cruz (2011), p. 50.

II. DIFFERENCES WITHIN COUNTRIES' REGIONS AND FISCAL DECENTRALISATION

Multi-tier fiscal arrangements exist in countries with high and low levels of economic development. They also exist in countries in which the level of economic development is broadly uniform across the countries' regions, and in countries where there are large, within-country, regional differences in per capita incomes. They exist where, because of the uneven distribution of mineral resources within a country (especially resources from exportable commodities), or because of the uneven distribution of good land, water, or good climate, some regions have much higher per capita incomes than other regions or simply because some regions have developed more quickly than other regions. These regional differences create strong pressures on national governments for policies that aim at reallocating income horizontally, from the richer toward the poorer regions. These policies often encounter strong resistance from the richer regions that object to this use of "their" financial resources.[5] It may often be easier, politically, for a *national* government to implement policies that help directly the poorer citizens, regardless of where they live, than to implement redistribution from richer to poorer regions in the hope that the regional governments will themselves redistribute income towards their poorer citizens. These policies of regional income reallocation have created major political difficulties in countries such as Belgium, Canada, Italy, Spain, Nigeria, and others.

The factors mentioned above have important implications for the kind of fiscal arrangements that can be established, or would be desirable to establish in countries. In principle, the greater is the unevenness in the income distribution of a country measured by some relevant index such as the Gini index, the more desirable might appear to be the role that the national government ought to play. As Richard Musgrave argued as far back as in 1959, generally it is the national government that is expected to play the major role in redistributing income with its national policies. However, not all national governments are capable or willing to play such a role. Politicians that represent particular regions at times control particular governments. Those that represent high incomes individuals control other governments. These two situations will lead to different policies. However, a national government that is seen as inefficient in the use of public resources, or as not dedicated to the welfare of the majority of citizens, cannot be expected to be the main actor in the pursuit of a more even income distribution.

In addition to the above, there may be social or cultural considerations that call for or that can promote fiscal decentralisation. The following deserve mention:

(a) historical, cultural or religious differences across regions of the same countries, as for example exist in Nigeria, Sudan, Iraq and other countries;
(b) linguistic differences across regions, as in Switzerland, Canada, Belgium and other countries; and
(c) ethnic, or racial, differences, as in South Africa.

[5]It is often the richer regions that object to policies that aim at horizontal (across regions) revenue redistribution, while it is the richer individuals or the parties that they control that often object to policies of income redistribution pursued by national governments.

These factors lead to pressures for decentralised policies and fiscal arrangements, because the regions may have significantly different preferences for particular economic policies or public services even though the basic needs of the populations can be assumed to be broadly the same.

Research by economists, political scientists, and sociologists has shown that these regional differences may affect attitudes vis-à-vis particular policies, as for example for policies that aim at income redistribution or at education.[6] Thus, economic policies, promoted by the national government, that tend to be the same for the whole country, may be more attractive to the populations of some regions than to those of other regions. The historical, cultural, religious, and linguistic developments have in many cases preceded the creation of national, political entities (nations) so that *national* governments that cover large and heterogeneous areas may not be seen as representative by particular regions. In a significant number of cases, the national entities (the nations) were promoted, or even imposed on the existing population, by distant colonial or foreign, powers. In other cases, the national entities were promoted by the action of a particular region, within the current country. The national countries were, thus, often created ignoring, or in spite of, the differences that existed within their territories. This is, for example, a common situation in several African countries, where different tribes were bound together to form the modern countries. It should not be surprising that in these cases, national policies may have more support in some regions than in others, and that some regions would prefer to have more autonomy.[7]

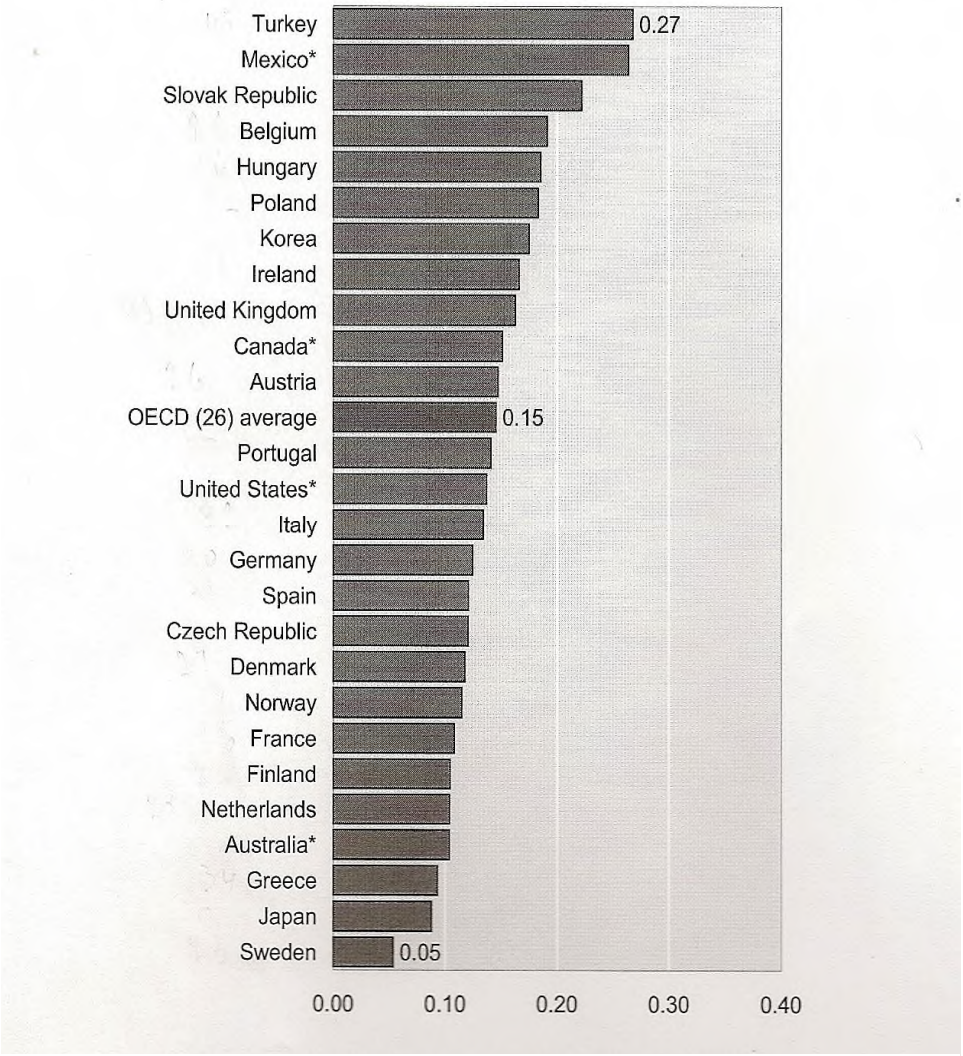
It is often forgotten, however, that the differences mentioned above do not stop at the borders between existing regions. They are at times duplicated, to some extent, *within* areas of the same regions, especially when in the past there have been significant migratory movements within the country and the regions' borders have not been adjusted over the years. Also the regional borders may have been adjusted at some point. A mistake made by a large part of the literature on fiscal federalism is that of assuming that the differences exist only, or mainly, *between* regions and that they stop at a region's border. Differences *between* regions can at times be matched by significant differences *within* regions. When this is the situation, the case for fiscal federalism loses some of its legitimacy, because the main justification for fiscal federalism is often differences *across* regions.

On one kind of difference, that in average per capita incomes *across* the regions of the same countries, there are data for many OECD countries. See Figure 1. The OECD has estimated the Gini coefficients for income differences *across* regions but within the same countries. These calculations implicitly assume that the per capita income is the same within a region but is different across the country's regions. With Ginis coefficients of 0.27 and 0.26, Turkey and Mexico, have the largest regional inequality. With Ginis of 0.05, 0.09, and 0.09, Sweden, Japan and Greece, have the lowest regional inequality. The average regional Gini for 26 OECD countries is estimated to be 0.15.

[6]The differences may not be confined only to economic matters but may extend to attitudes toward social issues, such as the education of women or the freedom of religious expression.

[7]In these cases even democratically-elected, national governments may be more representative of a region than of some others. The populations of particular regions may feel that the interests of other regions are disproportionately represented in the national government.

Fig. 1. Gini Index of Inequality of GDP Per Capita Across Regions within Each Country, 2003



Source: OECD (2007), 'Regions at a Glance'.
Notes: Data are estimated for TL3 regions, except for countries marked with an asterisk (*) which indicates that data are for TL2 regions. Regional type is defined in the methodology annex.

The regional Ginis do not seem to be highly related to the size of the country. For example, Australia, Germany and the United States have regional inequalities that are lower than those of Belgium, the Slovak Republic, Ireland and some other small countries. Furthermore, with the exception of Turkey and Mexico, that have high *regional* Ginis and high *national* Ginis, for the other countries the regional Ginis do not seem to be significantly related to the national Ginis. An important point to make is that the higher is

the *national* Gini, the greater is theoretically the need for *national* redistributive policies. The higher is the cross-region, or *regional* Gini, the greater is the justification for a fiscal decentralisation policy that would require policy measures that reassign resources from richer to the poorer regions.

Economic inequality across regions creates the main rationale for horizontal fiscal equalisation. Inequality within a country creates a strong reason for national policies of income redistribution. The national government must get the resources from the richer citizens wherever they are although they are more likely to be in larger numbers in the richer regions. Regions with lower per capita incomes have, ceteris paribus, a greater claim for getting transfers from the national government, especially if they are capable of using, efficiently and fairly, the resources that they get. The unequal costs of providing essential, but local public services in different regions of the same country may also play a role. For example some regions might have more school-age children, or more elderly individuals, needing more governmental spending for education or health services than regions with similar per capita incomes. These unequal costs may justify resource transfers that go beyond those justified strictly by the level of a region's per capita income. Unequal costs across regions may also be due to the size of a region, to the concentration of the population, to the demographic characteristics of the population, and so on.[8] However, these cost differentials must not be the outcome of different efficiency on the part of the different sub-national governments in the use of public resources.[9]

How big the differences in economic conditions *within* a country can be can be shown with the use of Brazilian data. In 1999, the per capita income across the 29 Brazilian "states" ranged from a high level of US$6008, in the Distrito Federal, and US$5060, in the state of São Paulo, to a low of US$770 in the state of Maranhão, and US$912 in the state of Piauí. The infant mortality rate ranged from a low level of 18.4, in Rio Grande do Sud, to a high level of 66.1, in Alagoas. The range in the illiteracy rate was from 32.8 in Alagoas to 5.1 and 6.1 in the Distrito Federal and in Rio Grande do Sul respectively. These are huge differences that justify horizontal resource transfers. Brazil has also one of the highest national Ginis in the world, thus justifying a large national government intervention to complement a federal fiscal structure that transfers significant fiscal resources to the poorest states. The data above come from a paper by Rezende and Afonso, mimeo, no date. It would he helpful to have similar date from other countries.

If a country were made up of different regions but all reflecting similar economic, cultural, linguistic, ethnic and geographic characteristics there would be little justification for fiscal decentralisation, unless the central government could collect taxes more efficiently while the subnational governments were more efficient in spending the revenue, perhaps by better assessing the needs of the population and its expenditure preferences.

However, the more different are the economic, cultural, and social characteristics *across* regions, and the more homogeneous are they *within* the regions, the stronger become the arguments for a federal structure. The main argument for a federal structure would be the different preferences that would exist across regions for public goods and social services. One region might prefer to spend more resources for festivals and sport events, while another

[8]The more disperse is the population, the more costly it is to provide services to it.

[9]Various studies have indicated wide differences in efficiency in the use of the resources provided to regions in Italy for educational and health services.

might prefer to spend more resources for cultural events and for education. However, if *within* the regions there are as wide differences in preferences as across the regions, a decentralised fiscal structure becomes less justified. If the distribution of personal income *within* the regions is highly uneven and the national government is more efficient at redistributing income, perhaps because it can better use progressive income taxes and better targeted expenditure programmes, there may even be an argument for fiscal *centralisation*. In fact this was in part the historical reason why the role of the *national* governments grew in the decades after World War Two. See Tanzi (2008) and Tanzi and Schuknecht (2000).

In conclusion, there are several considerations likely to play a normative role in the countries' decisions on which fiscal arrangements should be promoted. They must deal with the need for vertical transfers, from the national to the sub-national governments, and for some horizontal transfers, from richer to poorer regions. These arrangements must include especially those that determine the desirable tax revenue assignments that are the main focus of this paper. These considerations have received less attention than they deserve in the now vast literature on fiscal federalism. That literature continues to be influenced to a significant extent by the American circumstances and by the writing of US scholars, especially those in earlier years.

III. A TYPOLOGY OF TAX ASSIGNMENT POSSIBILITIES

In this section we present, in a schematic and simple way, the main tax assignments possibilities available to a country that chooses a fiscal decentralisation arrangement, or fiscal federalism. In the next section, these possibilities are described in more details, while providing some information on countries that have followed them, on the requirements for their successful use, and on their attractive features, or shortcomings, if any. A final section will draw some general conclusions.

1. Giving Sub-national Governments the Freedom to Set Up Their Own Tax Systems

The first option is that of giving subnational governments, and especially larger, intermediate governments (regions or states), the freedom to set up their own tax systems and tax administrations and to use any tax bases and tax rates that they choose. The same freedom could be given to the lower sub-regional tier (municipalities or counties). However, these governments are often too small and have less capacity to use successfully this freedom, unless they are large cities.

It is normally agreed that the only taxes that the sub-national governments cannot be allowed to use are the foreign trade taxes. The imposition of import and export duties must remain the exclusive prerogative of national governments. Whether, in this option, the subnational governments would need to receive also transfers or grants from the national government would depend on various considerations of which the most important would be large regional difference in tax capacity and the need for some equalisation of resources among regions. In this option the same tax base could be used by more than one tier of government.[10]

[10]In countries that follow this option, such as Brazil and the United States, some transfers from the national (federal) government to the sub-national governments are provided especially for specific, earmarked uses.

2. All Taxes are Collected Centrally and Shares of Total Tax Revenue are Transferred

In the second option, diametrically opposed to the previous one, the tax collection is the (almost) exclusive, monopolistic responsibility of the national government. It is the national government that has the authority and the administrative capacity to collect all or most taxes. Obviously, if this option is used, within a federal, fiscal arrangement, in which decentralised administrations are expected to provide some public goods and services to the citizens, the monopoly on taxing at the national level must inevitably be accompanied by a system of transfers to the sub-national administrations. The proportion of the taxes transferred may be fixed in time, or may be determined yearly or periodically.

This system exists in some form in what are essentially *unitary* governments. Examples are France and Chile. In these countries the sub-national "governments" are essentially or largely "administrative units" of the national governments. They manage the resources that they receive and follow guidelines established nationally. In this option, it is more correct to speak about fiscal decentralisation than of fiscal federalism.

Apart from political reasons that may lead to this kind of arrangement, it can be defended when (a) the national government is clearly more efficient in collecting taxes, than the sub-national governments would be, while (b) the sub-national administrations are more efficient in the use of the tax resources for the provision of some public services. Obviously it is the national government that retains the political power including that of appointing the local administrators although this may not be necessary. As Table 1 shows, Chile allows the direct election of city mayors and so does France.

3. Assigning the Exclusive Use of Some Taxes to Sub-national Governments

In the third option, specific taxes are assigned for the use of the sub-national governments, some to the regional governments and others to the municipalities. The decisions on which taxes to assign must be based on technical considerations and/or on revenue needs on the part of the second and third tier of government. The decision must also be made as to whether to assign to the sub-national governments not just the revenue from specific taxes but also the power to determine the tax bases and the tax rates for those taxes. In some cases the national government may choose to keep the prerogative to determine the tax base but let the subnational governments decide, freely or within a prescribed range, the rates.

In this option, it is likely that the national government will retain the right to use the highly productive, but administratively demanding, taxes, such as the value added tax and the personal and corporate income taxes, and let the other taxes to be used by the sub-national governments.

4. Sharing with the Sub-national Governments the Revenue from Some Nationally—Collected, Specific Taxes

In the fourth option the national government collects *most* of the important taxes, leaving some of the less important ones for the optional use by the sub-national governments so as to give these government some freedom at the margin. However,

following agreed, sharing arrangements, the national government shares the proceeds from particular taxes, such as the value-added tax or the income tax, with the sub-national governments. The national government also collects some taxes that it does not share, and the subnational governments also collect, for their own use, some taxes. The share of each tax may vary from tax to tax and may be adjusted from time to time.[11]

In the context of this fourth option it ought to be recalled that the taxes that in recent decades have generated the highest amounts of revenue to countries are the value added tax (since its introduction in France in the 1950s), the taxes on income (both personal and corporate), and the social security or payroll taxes. Foreign trade taxes, collected by the national governments, were very important in the past. However, their importance has fallen sharply in recent years due to the impact of globalisation and of trade agreements. This fall has reduced the revenue received from these taxes by the national governments. In conclusion, the sharing arrangements that are important in terms of revenue are those that concern the highly productive taxes.

When the total revenue needs of countries are modest, tax sharing arrangements tend to be easier, both technically and politically. But when the total revenue needs become high, sharing arrangements become more difficult. Because of changes in the structure of economies, and because different taxes have different elasticities with respect to economic growth especially over the longer run, arrangements or options that may have seemed right at the time they were made, may become difficult, or no longer right, at later times.

IV. A BRIEF EVALUATION OF THE ABOVE OPTIONS

In this section we comment briefly on the options mentioned above.

First Option

The first option is the one in which each government's tier has the freedom to levy any tax and choose any tax rate that it wishes. The only taxes that sub-national governments are not allowed to use are those on foreign trade (import and export duties). Foreign trade taxes must necessarily remain national because of trade agreements with other countries and also because, if free to use these taxes, the sub-national jurisdictions where ports of entry are located would be able to tax other jurisdictions, when the citizens or enterprises from those jurisdictions use the ports or the other points of entry to export or import goods. The sub-national governments must observe the "territoriality principle" of taxation that states that the taxes must be imposed on activities that take place within the territory of the jurisdiction that collects the taxes.

This option is technically easier when the regions or the municipalities, are large in size and in economic activity. For example, the state of California would be one of the G-8 countries if it were an independent country. Some of the Chinese provinces, or some of the Brazilian states, would be among the largest countries in the world, at least in terms of population or land area, if they were independent countries. Because of these

[11]There have been some rare examples in which taxes collected by regional governments have been shared upwards with the national government. To some extent this is still the case within the European Union that has become a kind of super-national government and that receives a share of the value added taxes collected by the member countries' national governments.

factors, these regions, or at least some of them, can be expected to have, or to be able to create, the administrative capacity to establish their own tax systems and their own tax administrations.[12] This assumption might be assumed to be behind the use of this option by the "states" in both the United States and Brazil. However, in both of these countries, historical reasons have been equally important. In both, the states, or the regional governments, existed *before* the national governments came into existence. Therefore, the constitutions of these countries have reflected and preserved these states' rights.

The political, and theoretical economic attractiveness of this first option is obvious. The subnational governments (or at least the regional governments) do not face political or legal constraints in their decisions, at the margin, to use any tax and any tax rates that they choose, to satisfy their revenue needs.[13] In principle, they can rely on their own resources (if they are willing and able to raise them) to finance any desired level of spending. This gives (at least some of them) a lot of political and financial independence from the national government. In the few countries that have allowed this option (especially the United States and Brazil) the sub-national governments (especially the states) have exploited this option and have been able to raise higher levels of revenue than might have been possible with other options.[14] In these countries the municipal governments partly depend on revenue collected from their own taxes and partly on revenue received from transfers that they receive from regional and/or national governments. In the United States, the municipal governments depend largely on revenues from the property tax that can be and is considered an important revenue source for the lowest government tier.

This first option is, however, not without costs or problems. The first cost is that all the subnational governments are forced to create their own independent tax administrations. Thus, there is a duplication of administrative costs for governments and an increase in compliance costs for citizens. Because of economies of scale in tax administrations, this option can lead to significantly higher costs of administration.[15] Second, not all the states or regions would be able to create equally efficient tax administrations. Some may be just too poor or too backward to do so.[16] Third, both skilled labour and financial capital tend to be highly mobile within a country. Thus, the freedom of a given state or region to impose taxes higher than other states may encourage mobility and may thus be reduced by the potential emigration of some tax bases. Even consumers tend to be mobile in their spending, especially if they live near the border of other regions that impose lower consumption taxes. Sales outlets often locate themselves

[12]Equally, cities such as New York, London, or Tokyo have large economies that make it feasible for them to impose any tax that they would want to use.

[13]However, agreements with other regions may constrain the level of the rates and some of the regions may not have much taxable capacity because they are too poor. This has been the case in Brazil. On the other hand, the use of retail sales taxes by the states in the United States may explain why it has remained the only major country in the world without a value added tax.

[14]In the year 2000, the Brazilian states collected 28 percent of Brazil's total tax revenue; the municipalities, 5 percent. In the United States the share of total taxes raised by subnational governments has been about half that of the federal government.

[15]It is also likely to lead to high tax complexity and high tax compliance costs. Surveys of tax systems have indicated that fiscally federal countries tend to have the most complex tax systems.

[16]This leads to an obvious question. If these regions are too poor to raise taxes, will they be able to set up the institution to spend well the money that they receive from central government transfers?

close to borders to attract consumers from other areas. For example, taxes on cigarettes or alcohol cannot differ much between neighboring regions. When they do, the regions that put higher tax rates lose buyers, and cross-regional smuggling becomes a problem. This has been a problem in both Canada and the United States and has become a major problem within the European Union.

Tax competition inevitably becomes an issue in this option, as it has become in the United States and Brazil, especially with the corporate income tax in the United States and with the value added tax in Brazil. These taxes are imposed by both the national and the sub-national governments in Brazil. Some states try to attract capital from other states by using lower tax rates and better tax incentives for corporations; and they try to attract consumers with lower value added taxes and lower excise taxes. Tax competition can lead to revenue losses to governments and to major economic distortions. Therefore it can reduce the sub-national governments' degrees of freedom in taxation. In extreme cases, it can lead to "tax wars". [See Prado and Cavalcanti (2000) and Tanzi (1995)].

The first option is not a good one for countries where the sub-national governments control areas with small and poor economies because they will not be able to set up efficient tax administrations and collect significant tax revenue. There are important economies of scale in tax collecting especially for some taxes, because of the fixed capital needed (computers, buildings, cars, etc.) and because of the needed operational systems and data necessary. The smaller and less developed economically is a jurisdiction, the more inefficient its tax administration is likely to be. Additionally, in an economically small jurisdiction, taxpayers and tax administrators are likely to live within the same areas and to know each other. This often leads to intimacy and intimacy leads to corruption.[17] In conclusion, when some jurisdictions are more developed than others, they will, ceteris paribus, end up with more tax revenue than the others. This would bring large differences in their ability to provide public services in the quality and quantity desirable unless the national government intervenes with significant transfers.

Second Option

This is the one in which all taxes are collected centrally, by a *national* tax administration.[18] In countries with a unitary-style government, it is the (national) government that decides which taxes to use, which rates, and how to spend the revenue collected. However, the actual spending may be done by decentralised agencies of the government, agencies that operate at the sub-national or local level. Unitary governments (such as the ones in Chile or France) generally have representatives ("prefets") and offices in the regions. These offices are responsible for the spending of the national revenue at the local level following nationally established rules. The "prefets", or other representatives, become highly knowledgeable about local conditions, needs, and preferences, but the guidelines are established centrally.[19] The unitary governments generally provide more freedom at the municipal level. Chile and France, for example, allow the election of city mayors and the use of some municipal taxes. A country does

[17]It is more difficult to apply arm's length principles to friends than to strangers. Tanzi (1995).

[18]This option does not prevent sub-national jurisdictions from collecting some fees for services that they provide to the citizens, and municipal jurisdictions from levying some local taxes.

[19]The "prefets" are a Napoleonic institution still in use in France, Italy, Chile and some other countries.

not need to be unitary to follow the second option. In a federal setting the national government could collect all (or most) tax revenue, relying on the best tax systems and tax administrations possible, and then allocate part of the revenue collected to the regions and/or to the municipalities following some agreed rules. However, this option also faces some shortcomings.

First, there may be the issue of the legitimacy of the national government, as perceived by the populations in different regions. Is the national government truly democratic? Is it perceived as representing equally well the populations from all the regions? Do some groups, or some regions, have more power within or more influence on the government than other groups or region?

Second, there is the question of the tax sharing formula that may not be the one preferred by some regions. Questions may be raised about the vertical sharing, i.e., what share of the revenue collected should the national government retain for itself and what shares it should distribute to the sub-national tiers? And what about the horizontal allocation of revenue, that is, the distribution among the regions or the sub-national jurisdictions?[20] Inevitably there will be claims that some regions should be entitled to a larger share than others. The poorer regions would claim larger shares because of needs. The richer regions, that presumably have paid more taxes because of their higher incomes, would feel entitled to a larger share.

Third, there is the major issue, stressed by the fiscal federalism literature, that, in this system, the sub-national governments are boxed in; they have little freedom or power that does not come from above. For example, the school system becomes a national school system, decided and imposed by the national government with identical curricula salaries for teachers and so on. This may eliminate much of the competition among school districts and is likely to reduce experimentation. As the supporters of fiscal federalism stress, even when the per capita incomes of the regions are the same, different regions may have greater or lower preferences for some public goods. The former might be willing to pay higher taxes, to bring their public spending closer to their preferences. This option is prevented in this system. Some experts go as far as to argue that the local administrators will be more wasteful in the use of resources received from the national government because, presumably, these resources do not represent a direct effort or sacrifice by the local administrations. However, this is not a convincing argument.

Third Option

The third option is that of assigning specific tax bases to the use by sub-national governments. It is an option adopted by many countries. The national government keeps some important taxes for its own use—especially the value added tax, the income taxes, and the payroll taxes, in addition to the foreign trade taxes—and allows the subnational governments the use at their discretion of all other taxes. These may also include locally imposed taxes on tax bases used also by the national government. For example in Argentina, the national government taxes consumption with a value added taxes, while the regional governments (that in Argentina are called provinces) tax consumption with a "cascading" turnover tax. If the Federal government of the United States should one day

[20]Unitary governments would probably aim at providing the same basic services for the citizens of all the regions. The more regional differences there are the more this uniformity will be questioned.

levy a value added tax, it would have to coexist with retail sales tax that many states now use.

This option allows "piggy-backing" by regional and even municipal governments on national taxes. For example, the national government might determine a tax base and tax it but it could allow the subnational governments to use, or "piggy-back" on, that base. This is done in the United States with the personal income tax and with the corporate income tax.[21] The states often use the same tax base (with some minor modifications) as the national government to impose some additional tax rates on that same base. In this way they can benefit from the information provided by the taxpayers to the national government, thus reducing their administrative costs. This approach also reduces the compliance costs for the taxpayers. Alternatively, the base for a given tax (as for example the property tax) is determined by the national government, but the tax is imposed and collected by regional governments although the national government could also tax it, if it chose to do so. This option removes the danger that the vicinity of the property owners to those who impose the taxes may lead to acts of corruption though the underestimation of the values of the properties, a danger that is more likely to exist when the property values are locally determined. It also shifts some of the administrative burden from the local governments to the national government. In Italy, the national government uses the traditional value added tax but the regional governments collect a special income version of that tax that is not the traditional credit-and-invoice one. Therefore, to some extent, in Italy there are two value added taxes as in Brazil.

In many countries, however, the exclusive use of the property tax and the administrative burden of determining the value of the properties rests on the municipalities. Other significant taxes that are allocated to the sub-national governments are: (a) taxes on car ownership and car use; (b) various excises; (c) taxes on local commercial activities (on shops, restaurants, movie houses, personal services, hotels, stands at fairs or outdoor markets); (d) taxes connected with some local gambling activities; (e) taxes connected with, or justified by, garbage collection or other municipal services; (f) taxes on commercial parking; and other similar taxes. Fines on parking or moving violations by cars within cities have become indirect but significant ways for municipalities to raise money. They have become de facto "pseudo taxes". Some of these taxes are based on a "benefit received" principle, because they are considered payments for services (use of streets, street lighting and street cleaning, police protection,) that benefit the local citizens.

Of the above taxes, the most important, in terms of potential revenues, are the property taxes, the taxes on car ownership, and some excises, especially those on cigarettes, gasoline, and other items of mass consumption, such as soft drinks.[22]

Property taxes have provided revenue of up to four percent of GDP in some highly urbanised and developed countries, such as Singapore. They generate about three percent of GDP in the USA. However, their revenue generation is generally not more than one percent of GDP. Taxes on car ownership can raise significant revenue, especially when

[21]The states that use the income taxes generally use the same tax bases as the Federal government and exchange the information on the taxpayers in their state with the national tax administration.

[22]As Roy Bahl put it (no date): "Motor vehicle ownership and use represent an excellent but much neglected tax base for urban governments in developing countries". He also considers the residential property tax...the ideal local tax..."

the tax payments are related to the value or the size of a car, making these taxes somewhat progressive. The growing use of cars in many countries makes this a potentially elastic tax with respect to economic growth. Taxes on specific products (gasoline, soft drinks, cigarettes) can also be important for local governments and are not difficult to collect. Therefore, local governments should not ignore the possibility of using these taxes.

Tax experts consider the property tax as a good tax for use by sub-national governments and, especially, by municipal governments. The reason is that the property tax is applied on a tax base (land and buildings) that is immobile.[23] The tax can also be justified as a payment for services received by the property from the local governments. Generally the property tax tends to be proportional or even progressive with respect to income, because richer individuals tend to own larger and more expensive houses. However, to be productive this tax requires the availability of good and up-to-date *physical* cadasters. These are official registers that describe precisely the physical characteristics of each property and identify clearly their current owners. Once the physical cadasters are available, market values must be determined and attached to each property and the values must be kept updated. This is not an easy task, especially in countries in which inflation is a problem and modification to the physical characteristics of properties are frequent. Often the physical cadasters are in poor shape and the property values have not been adjusted, or have been adjusted with long lags making them fall behind the actual market values. This makes these taxes progressively less productive and less equitable.

In some countries, including Italy, there has been an unfortunate tendency to *personalise* the property taxes, presumably to make them more "fair", by taxing at different rates different categories of taxpayers or even of properties. These categories may be related to the ages of the owners, their potential disabilities, the number of people living in the houses, whether the house is the first house for a family or a second, vacation house, and so on. The more this tax tries to take into account different family situations, the more unproductive in terms of revenue, and the more distortional in terms of resource allocation, it becomes. It is the classic case when the perfect becomes the enemy of the good. This tax works best when it follows the simplest principle: (a) it is an *ad rem* tax,[24] and (b) the property values are correct and are kept updated.

National and sub-national governments often levy taxes on energy use, especially on gasoline. For these taxes, "piggy-backing" by sub-national government is easy. These taxes are easy to collect (from the enterprises that sell the gasoline), can be justified on the principle of benefits received (because of the free use of most road by cars), and on that of ability to pay, because those who own cars generally have higher incomes. An additional justification for collecting these taxes is the contribution that energy consumption is supposed to make to global warming, or, at least, to environmental problems.

Some countries tax both energy consumption *and* automobile ownership using the same justification for taxing the latter as mentioned in the last paragraph for taxing

[23]However, while land and already built buildings are immobile, high taxes may discourage future buildings or expansion on existing land.

[24]That is a tax on a *thing* and not on a *person*.

gasoline. Automobiles need to be registered, generally in the jurisdiction where their owners live. They may be required to pay taxes at the time of registration, and the taxes may be paid annually.[25] They can be made progressive with respect to the value of the car or to the size of the engine. These taxes can provide significant and increasing revenue to sub-national jurisdictions.

Fourth Option

In the fourth option the tax revenues that are shared with the subnational governments are not the total revenues collected by national governments but shares of the revenue from *specific* taxes. For example, the national government may agree to divide with sub-national governments the revenue from the value added tax or the income taxes. The proportions may be stipulated for a long period or they can be negotiated periodically. Several countries, including Argentina, Russia, Brazil, Spain and others, follow this option. In Spain for example, the regions receive 33 percent of the revenue from the personal income tax and 35 percent of the revenue of the value added tax. When the possibility of renegotiation is possible, it opens, for the central government, the possibility of passing on the subnational governments its fiscal problems, when it runs into financial difficulties. This happened in Argentina in the 1990s and in some other countries. Often fiscal adjustments are achieved by shifting the cost of the adjustment on the local governments. The financial difficulties of the national governments are shifted on the lower levels through a reduction of the taxes shared. Of course the reverse possibility also exists, when the subnational governments are politically powerful. It happened in Brazil in past years, when some states (and especially the state of São Paulo) had accumulated large foreign debts and had to be rescued by the national government.

The main attraction of this fourth option is that the national tax administration is generally more efficient in collecting the main taxes and especially the value added tax and the income taxes. A significant shortcoming is that, as the share of the collected taxes passed on to the sub-national governments increases, the interest on the part of the national tax administration to administer well these particular taxes may be reduced. An other significant problem is that the national tax system may progressively get distorted because the national government acquires an interest in introducing non shared taxes, even bad ones. For example, in recent years the Argentina government has relied more and more on export taxes, because the revenue from these taxes is not shared with the sub-national governments.

Another problem with this option is that a decision must be made not only on what proportions of the shared taxes to pass downward, in order to correct for the "vertical imbalance" that exists between the national government and the subnational governments, but also on how the shared portion is to be allocated among the sub-national governments in order to correct for the so-called "horizontal imbalance" that often exists between poor regions, or poor municipalities, and rich ones. However, general revenue is often used for this purpose.

[25]Drivers' licenses may also be taxed.

V. CONCLUDING OBSERVATIONS

The discussion in this paper has indicated that there are several possible arrangements for assigning tax revenue to sub-national governments. Some of these arrangements give the latter the right to impose their own taxes. Other arrangements, give them the right to share in taxes collected by the central government. Which arrangement a country chooses or should choose would depend on technical considerations, on the relative power of the different tiers of government, on the existence of constitutions that determine the arrangements and, possibly, on other factors. It seems futile to search for an "optimal" arrangement that would fit all countries because there are wide variations among the countries' circumstances.

When the first of the above alternatives is chosen, there is the concrete possibility that the subnational governments, or at least some of them, may be too poor, and not enough sophisticated, to be able to make good use of the "power to tax" provided to them. Thus, in this option, both "vertical imbalances" and "horizontal imbalances" may appear requiring corrections.

When the second alternative is chosen, the sub-national governments become politically and financially dependent, or more dependent, on decisions made centrally. As a consequence, their fiscal freedom becomes limited. Apart from political considerations, and from historically determined sharing arrangements, economies of scale in tax administrations and potential tax competition are factors that must be taken into account in choosing the right option. When the tax collection is fragmented among many different jurisdictions, especially for the major taxes (value added tax and income taxes), the costs of collection for the tax administrations and the compliance costs for the taxpayers are likely to rise, while the revenue collected is likely to fall.

The above discussion has indicated that there are some potentially productive taxes that lend themselves more easily to the use of sub-national governments, including municipal governments. The efficient use of these taxes could significantly increase the tax autonomy of these jurisdictions, thus reducing the size of the vertical imbalance and the need for controls from the top. Among these taxes the following merit specific mention: property taxes, especially those on urban properties; taxes on the ownership of cars and, possibly, of phones; excises on gasoline, alcohol, cigarettes, and soft drinks and taxes connected with garbage collection; some "presumptive" taxes on business activities such as shops, market stands and so on. All these taxes can be justified on the grounds of benefit received or negative externalities created. If well used, these taxes could raise significant amount of resources, say over five percent of GDP. Most jurisdictions should be able to collect these taxes. However, horizontal imbalances would still remain, because of different levels of developments. It will be up to the national government's goals to decide whether and by how much these imbalances should be reduced or eliminated with earmarked transfers and unconditional grants.

This takes us to the major and most productive taxes, such as the value added tax and the taxes on personal or enterprise incomes. With relatively few exceptions, these taxes are generally used at the national level. As Richard Bird put it with respect to the value added tax (VAT):

> "… most but not all federal countries have VATs" "29 of the 30 OECD countries –all except the United States—apply a VAT…" "All these VATs are levied by central governments".

There are a few exceptions however. Brazil has value added taxes at both the national and the state level. Italy has what could be considered a value added tax at both the national and the regional levels. The one at the regional level is called IRAP. It is an origin-based, income-type, VAT. It is payable by businesses on the sum of wages, profits, rents and interest payments that measure the enterprise value added. See Ahmad and Brosio, 2008. Many Italians consider the IRAP as the most hated tax in Italy. The government has not succeeded in getting rid of it mainly because of its revenue contribution, about two percent of GDP. The Brazilian use of the VAT at the state level has also led to enormous problems of efficiency and even to "tax wars" as states have tried to compete with other states by providing unfair incentives. For years Brazil has been trying to get rid of this sub-national, value -added tax. This tax makes it difficult for Brazilian exporters to rebate exports. The same is true for the Italian IRAP. Thus both of these taxes have become a burden on exporters.

Other countries that have used general sales taxes at both the national and the sub-national levels—Canada, Argentina, others—have used the value added tax at the national level and other kinds of sales taxes at the local levels. There have been various proposals by tax experts that would make it possible for multi-government jurisdictions to use VATs at lower government tiers. See Boadway (2010), Bird (2010), Ahmad and Brosio (2008). Although theoretically possible, these alternatives (with names such as CVAT, VIVAT, etc.) are not likely to operate well in the real situations that exist in the majority of countries. Therefore, in the view of the writer of this paper, when a valued added tax is used, it is best to use it at the national level and, if necessary, to allocate part of the revenue to the sub-national jurisdictions by the use of some formula. A simple way to distribute a share of the revenue from the VAT would be in proportion to the population of the various regions. It would be simple and would reflect a progressive criterion. Perhaps it ought to be added that a VAT works best when it uses a single rate on the broadest possible tax base. Using this approach even relatively unsophisticated countries, such as Ecuador, have succeeded in making this tax highly productive.

Similar considerations prevail for the taxes on personal and enterprise incomes. For these taxes, there are difficulties in their use at the subnational level, especially when the activities of the enterprises and of the individuals are national in scope. For the personal income tax, it would be possible for sub-national governments to tax separately *specific components* of income, such as payrolls, rents, dividends and some others. It would be difficult or impossible to tax the *global* (aggregated) incomes of individuals unless the sub-national jurisdictions "piggy-back" on national taxes, using the same tax base as the national government and relying on a system of full exchange of information with the national government, as done in the United States. It has to be recognised that emerging markets and developing countries already encounter significant difficulties to tax personal incomes even at the national level.

Similar considerations apply to the taxes on business enterprises especially those that operate in more than one jurisdiction. This opens the way for jurisdictions to try to attract investments in their territories by lowering taxes and offering tax incentives, thus

leading to tax competition and other tax problems. When these taxes are collected at the national level, some formulas (based on sales, property and employment in each jurisdiction) can be used to allocate the revenue across the sub-national institutions.

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Comments

In Pakistan, choices have been made in terms of which taxes would be included in the divisible pool and how to share taxes between the federal and provincial governments as well as the horizontal sharing arrangements between the provinces in the context of the last Finance Commission Award. This award is scheduled to remain in place for the next four and a half years.

However, as already mentioned by Professor Tanzi and Governor Kardar, the level and stability (i.e., lack of growth) of tax revenue is the big issue. I would like to comment on this aspect. Professor Tanzi has provided an interesting historical perspective in saying that the level of tax revenue to GDP of 10 percent of GDP has not changed since he first came to Pakistan about 25 years ago. I think that one of the reasons why the tax revenue has remained low is the relatively low level of equity within the taxation system. Some people are paying a lot in taxes while many other people are paying very little or nothing at all and this issue has received a lot of discussion in the past few months in Pakistan.

To improve tax collection in Pakistan, more equity in the tax system is needed, so it is perceived as fairer and the burden of taxation is shared more equally so that everybody contributes in paying taxes in Pakistan. More equity requires efforts on behalf of both the federal government as well as provincial governments. The provincial governments have an important role because many items of taxation are provincial subjects, i.e., the provinces decide whether or not to levy taxes on those items. Further, as provincial governments only collect about five percent of the total taxes and as a Table in Professor Tanzi's paper shows that is relatively low. In Pakistan 95 percent of tax is collected by the federal government which compares to figure 80 percent in Latin American countries.

The reason for both the federal and provincial governments need to play their parts in mobilising more tax revenue is to raise the level of savings in Pakistan. The level of savings needs to be increased in Pakistan to create a domestic cushion to reduce the vulnerability of the economy to economic shocks, so they do not result in a crisis in the Pakistan economy. Further, additional saving is needed to finance more investment to create jobs and growth needed to employ the growing labour force and raise living standards. Moreover, this revenue is needed to finance poverty reduction and spending on health, education and infrastructure.

Thank you for your attention, this concludes my comments.

Paul Ross

International Monetary Fund,
Islamabad.

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The Gustav Ranis Lecture

Empowering States and Provinces or Unshackling Local Governments: Does It Matter for Peace, Order, Good Government, and Growth?

ANWAR SHAH

Globalisation and the information revolution are profoundly influencing the division of power within, across, and beyond nation-states. Within nations, this mega change has led to a diminished economic relevance of the intermediate order of government (states and provinces) and an enhanced need for home rule (empowered local governments) in both unitary and federal countries. Considerations of peace, order, and good government further warrant that intermediate orders of governments must assume a relatively less prominent role in multi-order governance. The recent fiscal crisis and the ever-growing concern about corruption have further heightened the need to the get the government right, thereby creating additional pressures to limit the size of the government by possibly downsizing the role of the states/provinces and reconstituting these as provincial councils of local governments to perform inter-local functions and coordination. These economic imperatives, calling for an *hourglass model of federalism,* are at odds with the political realties in countries conforming to the *traditional dual federalism model*, i.e., federalism of the provinces model of economic governance as prevalent in Australia, India, Mexico, and Pakistan, among others. The political order in these latter countries has blocked local governments from assuming their due role as the primary agents of the people providing oversight on the shared rule and as facilitators for network governance to improve the economic and social outcomes. Such a role of local government is also critical to international competitiveness and growth as demonstrated by the experiences of China, Japan, Korea, and the Nordic countries. This paper outlines reform options for multi-order governance to conform with the new world economic order. The paper elaborates the role of local governments under 'glocalised governance'—the new vision of multi-order governance—and argues that growth and economic prosperity of nations in the coming decades would critically depend on how quickly political and institutional impediments to the new (or the oldest?) paradigm of local governance are overcome. The paper concludes that path dependency makes such radical reforms infeasible in countries with strong provincial governments run by feudal, military, and industrial elites.

INTRODUCTION: MOTIVATIONS FOR RETHINKING FISCAL FEDERALISM

Globalisation and the information revolution are profoundly influencing economic governance in both the industrial and the industrialising world.

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Globalisation has lifted millions of people out of poverty and the information revolution has brought about a degree of citizen empowerment and activism in state affairs that is unparalleled in past history. They have also acted as catalysts for "reshuffling" government functions within and beyond nation states [Friedman (1999); Courchene (2001); Castells (1998); Shah (1999, 2002); Boadway and Shah (2009)]. Globalisation has also meant liberating markets and bringing market discipline to governments. Recent global financial crisis has significantly shattered common faith in the workings of free markets. Providing bailouts to markets have also endangered the fiscal health of governments around the globe while creating a crisis in public confidence in national politics and leadership. This paper reflects upon special challenges in adapting multi-order governance to make it incentive compatible with growth with equity and fiscal sustainability, urgency of which is brought home by these mega changes.

Because of globalisation, it is increasingly apparent that " ..the nation-state is becoming too small for the big problems of life , and too big for the small problems of life" [Bell (1987), pp.13–14]. In other words, nation-states are gradually losing control of some of their customary areas of authority and regulation, including macroeconomic policy, corporate taxation, external trade, environment policy, telecommunications, and financial transactions (see Box 1). Globalisation is also making small open economies vulnerable to the whims of large hedge funds and polarising the distribution of income in favour of skilled workers and regions with higher skills and access to information, thus widening income disparities within nations while improving overall levels of incomes and standards of living. Because of the information revolution, governments have less ability to control the flow of goods and services, ideas, and cultural products. The twin forces of globalisation and the information revolution are also strengthening localisation. They are empowering local governments and "beyond-government" service providers, such as neighbourhood associations, non-governmental non-profit and for-profit organisations, self-help groups and networks to exercise a broader role in improving economic and social outcomes at the local level through greater connectivity to markets and resources elsewhere. Localisation is leading to citizen empowerment in some areas while simultaneously strengthening local elites in others. Courchene (1993, 2001) has termed the overall effect of these changes "*glocalisation"*, which implies the growing role of global regimes and local governments and beyond government entities and changing roles of national and provincial (state) governments in an interconnected world. The culture of governance is also slowly changing from a bureaucratic to a participatory mode of operation, from a command-and-control model to one of accountability for results, from being internally dependent to being competitive and innovative, from being closed and slow to being open and quick, and from being intolerant of risk to allowing freedom to fail or succeed. Recent global financial crises has hampered this change, but with improved macro stability in future, the new vision of governance is expected to gradually taking hold in the 21st century (see Table 1). Nevertheless, in many developing countries, this vision may not take hold or may take a long time to materialise because of political and institutional difficulties.

Box 1

Emerging Rearrangements of Government Assignments: Glocalisation

Beyond nation-states: Regulation of financial transactions, corporate taxation, international trade, the global environment, telecommunications, international standards, international migration, surveillance of governance conditions, global security and risk management, transnational production, investment and technology transfer, combating of money laundering, corruption, pandemics, and terrorism.

Centralisation: Social and environmental policy through international agreements, skills enhancement for international competitiveness, securing common economic union through bridging economic, social and digital divide within nations, social safety nets, oversight, financing of education, social services and technical assistance to sub-national governments.

Localisation, and Privatisation: All regional and local functions.

S*ource:* Boadway and Shah (2009).

Table 1

Governance Structure: 20th versus 21st Century

20th Century	21st Century
Centralised or provincialised	Globalised and localised
Centre that manages	Centre that leads
Citizens as agents, subjects, clients and consumers	Citizens as governors and principals
Bureaucratic	Participatory
Command and control	Responsive and accountable
Internally dependent	Competitive
Closed and slow	Open and quick
Intolerance of risk	Freedom to fail or succeed
Focus on government	Focus on governance with interactive direct democracy
Competitive edge for resource based economies	Competitive edge for human capital based economies
Federalism as a tool for coming together or holding together	Global collaborative federalism with a focus on network governance and reaching out
Residuality principle, ultra vires, "Dillon's rule"	Community governance principle, subsidiarity principle, home- or self-rule and shared rule
Limited but expanding role of global regimes with democracy deficits	Wider role of global regimes and networks with improved governance and accountability
Emerging federal prominence in shared rule	Leaner but caring federal government with an enhanced role in education, training, and social protection
Strong state (province) role	Ever-diminishing economic relevance of states (provinces) and tugs-of-war to retain relevance
Diminishing role of local government	Pivotal role of local government as the engine of economic growth, primary agent of citizens, gatekeeper of shared rule, facilitator of network governance; wider role of "beyond government" entities
Tax and expenditure centralisation with revenue sharing and input based conditional grants to finance subnational expenditures	Tax and expenditure decentralisation with fiscal capacity equalisation and output-based national minimum standards grants

Sources: Boadway and Shah (2009).

The three emerging trends resulting from this mega change in the shifting balance of powers within nations are: (a) the role of the central government is slowly changing from that of a managerial authority to a leadership role in a multi-centred government environment with enhanced emphasis on securing a common economic union through economic and social risk management and dealing with economic and digital divide within nations; (b) a steady erosion in the economic relevance of the role of the provinces (used inter-changeably with states in this paper)—the second (intermediate) tier—and (c) an enhanced but redefined role of local government in multi-order governance to serve as the primary agent of people providing oversight on the shared rule and as a facilitator for network governance for economic and social uplift of its residents.

This paper is concerned with potentials and perils associated with adaptive responses to these challenges especially in reshaping the role of provinces and local governments. The paper is organised as follows. Section 2 discusses the role of the provinces (states) and local governments under a traditional fiscal federalism approach. Section 3 discussion the same under a new vision of multi-order governance. Section 4 draws implications of the alternate models for peace, order, good government and growth from cross country and country case studies. A final section draws broader policy implications of this analysis.

2. EMPOWERING PROVINCES AND STATES— POTENTIALS AND PERILS

Federalism represents either a "coming together" or a "holding together" of constituent geographic units to take advantage of greatness and smallness of nations. Traditionally it represented a "foedus" (treaty or compact or alliance) among states (provinces) "each of which recognised the legitimacy of an overarching central government to make decisions on some matters once exclusively the responsibility of individual member states" as done in the USA [Inman (2007), p. 530]. "Coming together" has been the guiding framework for mature federations such as the United States, Canada, and more recently the European Union. The alternative "holding together" view of federalism, also called the "new federalism" represents an attempt to decentralise responsibilities from federal government to the states or provinces with a view to overcome regional discontent with central policies and forestall secessionist tenmdencies. This view is the driving force behind the current interest in principles of fiscal federalism in unitary countries and relatively newer federations such as Brazil, India and Pakistan and emerging federations such as Iraq, Nepal, Spain, Sri Lanka and South Africa. In Pakistan this was the primary motivation for unanimous consent to a recent passing of the 18th Amendment to the Pakistan's constitution to empower provinces. Federal countries broadly conform to one of two models: dual federalism or cooperative federalism. A third model, the so called 'competitive federalism'. Where all governments have overlapping responsibilities and compete vertically and horizontally to establish their clientele of services, is simply a theoretical construct and not practiced anywhere. Under dual federalism, federalism compact is between federal and provincial governments and they have separate and distinct responsibilities and local governments are typically creatures of the provinces as in Canada, USA, India and Pakistan. Under cooperative federalism, central and provincial roles can assume one of three forms:

interdependent spheres as in Germany, marble cake with overlapping responsibilities as in Belgium or independent spheres as in Brazil. In all these models with the sole exception of independent spheres model, provinces have a strong constitutional role and local governments remain creatures of provinces and states.

The dual federalism model empowers provinces and states. This is considered a welcome move as it moves decision making somewhat closer to people and it also has the advantage of dealing with ethic and linguistic conflicts if provinces are numerous and are small enough in geographic area and represent population with relatively homogeneous characteristics and similar tastes and preferences for a menu of taxes and public services (as Cantons in Switzerland). If provinces are properly delineated as economic regions then they could also enhance efficiency of the internal common market by exploiting economies of scale and scope. They also have the potential to deal with inter-local spillovers and intra-regional inequities. Provincial governments can also be responsive to citizen preferences if provincial government is not captured by feudal, industrial and military elites. The absence of well developed communication and transportation system and a lack of urbanisation also makes provinces almost a necessity for countries that span a large geographic area.

The dual federalism model empowering provinces, nevertheless, has significant shortcomings.

Tragedy of Commons Associated with Common Pool Resources. Under dual federalism, both the centre and the provinces compete to claim a larger share of the fixed national pie. This accentuates universalism and pork barrel politics leading to a tragedy of commons where all federating units outcompete each other in profligate spending and giveaways in taxes and subsidies. This tug of war over resources and the resulting swings in the balance of powers within nations is a perpetual feature of dual federalism model.

A Leviathan Model of Governance. Empowering provinces leads to a potential for greater duplication of government structures and processes at central and provincial levels leading to increased costs for the exchequer and higher transactions costs for citizens. This may also lead to overgrazing by politicians and bureaucrats. As a result the growth in the size of government becomes unrelated to quality and quantity of service delivery. Opportunism and pork barrel politics leads to governments acting as employment creation agencies detracting them from their primary role in financing public services.

Agency Problems with Incomplete Contracts. In most large countries, empowering provinces does not necessarily imply that the decision making moves closer to people. Provinces and states are often larger in geographic size and population than smaller countries. Governments of New York, California, Ontario, Sao Paulo, Punjab, Sindh, Balochistan, and Indian states of Bihar and Gujarat have jurisdictions exceeding the size of many countries. Having decision making far removed from people implies that provincial governments have incomplete contracts with their citizens and could not be held to account by people at large. In countries where politics is dominated by feudal, military and industrial elites such as Pakistan, this leads to complete alienation of governments from their people. This lack of accountability in governance is further accentuated by a constraining of voice and exit options under provincial empowerment.

Weaker and Fragmented Local Governance. Empowered provinces create incentives for weaker and numerous local governments. The exigencies of provincial politics dictate that local governments are given straight jacket mandates with little resources and are kept under tight provincial reigns as in done in India and Pakistan [see Shah (1997)]. The empowered provincial governments typically encourage local fragmentation in the interest of higher degree of intrusive controls. In India, there are 254,119 local governments responsible for a pitience of (5 percent) of national expenditures. Most of these expenditure go towards financing the salaries and allowances of civil servants and 3 million elected officials with little left to deliver public services. In contrast, in China where provincial role is restricted and local governments are empowered, there are only 43, 965 local governments accounting for 51.4 percent of national expenditures [see Qiao and Shah (2006)].

Stifling Local Innovations. Provinces and states often impose one size fit all straight jacket mandates that constrain local choices and flexibility and stifle any innovative approaches. In Pakistan, provincial ordinances in 2000 required all local governments, small or large , to have 16 departments and fixed number of positions. In the United States, outdated state laws that are rooted in unjustified distrust of local decision making have stifled successful cities to develop and implement any coherent vision of their future and serve their residents better [see Frug and Barron (2008)].

Constraining Good Governance and Strangling Metropolitan Growth. Empowered provinces typically block rationalisation of local government functions especially when the local government empowerment implies chipping away at their own powers. A classic example in this regard is the powers assigned to metropolitan areas under dual federalism. Fiscal federalism literature suggests that large metropolitan areas should have autonomous two tier regional governments with powers equivalent to that of a province and with direct interface with the centre. For this reason, Shanghai and Beijing , Bangkok and Seoul local governments are treated by China, Thailand and South Korea respectively as provinces. In contrast, in India and Pakistan, where provinces are relatively more powerful, metropolitan areas with large populations and significant economic bases such as Mumbai, New Delhi, Karachi and Lahore among others are treated as typical local governments with limited autonomy. Such treatment deprives residents of the benefits of home rule and constrains their efforts in local economic development.

Fragmentation of Internal Common Market. Empowered provinces also have the potential to create internal barriers to trade and factor mobility through domicile (residence) requirements and by creating protective regulatory and trade barriers across provincial borders. Mature federations like the USA have circumvented these problems through interstate commerce clause in the constitution. These barriers, however, are formalised in the political and bureaucratic system of India and Pakistan resulting in fragmented common economic union .

Increased Threat of Succession. Empowering provinces represent a potential threat to the political union especially in countries with ethnic, linguistic and religious divides and having smaller number of provincial jurisdictions with one or more dominant provinces such as Pakistan. Fiscal federalism literature shows that as a rule of thumb all dual federalism models with less than 10 provincial jurisdictions are likely to face internal conflicts and potential political instability.

Diminished Economic Relevance of Intermediate Order of Government (Provinces and States) under Glocalised Governance. Finally and most importantly globalisation and information revolution are working to make the economic role of provinces largely redundant. Globalisation empowers supranational regimes and local governments at the expense of national and provincial governments. Globalisation also implies that international competitiveness of a nation is decoupled from its resource base but directly linked with its knowledge base. This suggests a greater role of national government in financing education and training. National government also assumes greater importance in social risk management due to vagaries of global system and social dumping by corporations to stay internationally competitive. National government also assumes a greater role in securing a common economic union. Provincial economic role on the other hand is on the wane as the information revolution makes national coordination and oversight over local governments and horizontal coordination at the local level through inter-local partnerships feasible as done in Finland. In view of the above pressures, states and provincial governments are under growing tension to reposition their roles to retain economic relevance. The political role of states and provinces, however, remains strong in all nations and even on the rise in some nations as in Germany, Pakistan and India. In Germany, the Lander has assumed a central role in implementing European Union directives and in policy making for regional planning and development. In India, states have effectively blocked implementation of the 73rd and 74th amendments to the Constitution empowering local governments. In Pakistan provinces have recently moved to scale back the fiscal and administrative autonomy of local governments.

In conclusion while economic considerations warrant a leaner role for provinces and an expansive role for local governments, developing countries are unlikely to adapt a smooth transition of such role reversals.

3. UNSHACKLING LOCAL GOVERNMENTS— EMERGING IMPERATIVES

Motivations for Rethinking the Role of Local Governments

Globalisation and information revolution has brought about a paradigm shift in international competitiveness of nations. Economic prosperity of a nation is now more closely linked to the knowledge, skills and information base of its citizens rather than the country's resource endowments. It is increasingly recognised now that local governments, especially cities, are at the core of the future prosperity of a nation in view of their better positioning to forge a competitive advantage to spur economic growth by fostering a new knowledge based economy. With capital mobility and deregulation, local governments as providers of infrastructure related services, are more appropriate channels for attracting domestic and foreign investment. Cities are increasingly becoming important players in international economic alliances. Global financial crisis has diminished people's trust both in the markets and role of central governments in regulating such markets. With a cloud of fiscal distress looming over the world horizon from bailouts of financial markets, local governments may also hold the key to fiscal heath and sustainable public finances as costly centrally determined and delivered services are replaced by locally demanded and competitively delivered services at the

local level. Closer to home, people are increasingly more likely to link their identities with local jurisdictions and are demanding higher quality local services to improve economic and social outcomes. But local governments with few exceptions (e.g. China, Denmark and Finland) are hamstrung to play a leadership role in local economic development in view of the constraints imposed by higher orders of government. To reshape the role of local governments to conform to the new world economic order, one has to review both the theory and the past legacy in practice.

Roles and Responsibilities of Local Governments: Analytical Underpinnings

There are five perspectives on models of government and the roles and responsibilities of local government: (a) traditional fiscal federalism, (b) new public management (NPM), (c) public choice, (d) new institutional economics (NIE), and (e) network forms of local governance. The federalism and the NPM perspectives are concerned primarily with market failures and how to deliver public goods efficiently and equitably. The public choice and NIE perspectives are concerned with government failures. The network forms of governance perspective is concerned with institutional arrangements to overcome both market and government failures [see Shah and Shah (2006, 2007)].

Local Government as a Handmaiden of a Higher Government Order: Traditional Fiscal Federalism Perspectives

The fiscal federalism approach is focused on internalising benefits and costs of service provision to the same jurisdiction and treats local government as a subordinate tier in a multi-tiered system and outlines principles for defining the roles and responsibilities of various orders of government [see Boadway and Shah (2009) for such a framework for the design of fiscal constitutions]. Hence, one sees that in most federations, as in Canada and the United States, local governments are creatures of state (intermediate order) governments (*dual federalism*). In a few isolated instances, as in Brazil, they are equal partners with higher-level governments (*cooperative federalism*), and in an exceptional case, Switzerland, they are the main source of sovereignty and have greater constitutional significance than the federal government. Thus, depending on the constitutional and legal status of local governments, intermediate order governments in federal countries assume varying degrees of oversight of the provision of local public services. In general, this perspective constrains the role of local governments as their expansive role comes at the expense of the powers of the intermediate order of government. As globalisation and information revolution leads to diminished economic relevance of the intermediate order of governments, these conflicts are accentuated and intermediate order governments have a tendency to play a more intrusive role at the local level to stay politically relevant. The fiscal federalism perspectives serve as a response to market failures and heterogeneous preferences with little recognition of government failures or the role of entities beyond government.

Local Government as an Independent Facilitator of Creating Public Value: New Public Management Perspectives

Two interrelated criteria have emerged from the NPM literature in recent years determining, first, what local governments should do and, second, how they should do it

better. It argues that the role of public managers in local governments is to tap free resources of the community (goodwill, good Samaritan values) and push the frontiers of improved social outcomes beyond what may be possible with meagre local revenues [Moore (1996)]. Thus, public managers create value by mobilising and facilitating a network of providers beyond local government. This environment, focused on creating public value, encourages innovation and experimentation, bounded by the risk tolerance of the median voter in each community. The main current of the NPM literature is concerned not with what to do but with how to do it better. It argues for an incentive environment in which managers are given flexibility in the use of resources but held accountable for results. Top-down controls are thus replaced by a bottom-up focus on results.

Local Government as an Institution to Advance Self-interest: The Public Choice Approach

The public choice literature endorses the self-interest doctrine of government and argues that various stakeholders involved in policy formulation and implementation are expected to use opportunities and resources to advance their self-interest. This view has important implications for the design of local government institutions. For local governments to serve the interests of people, they must have complete local autonomy in taxing and spending constrained only by direct democracy provisions and they must be subject to competition within and beyond government. In the absence of these prerequisites, local governments will be inefficient and unresponsive to citizen preferences [Boyne (1998) and Bailey (1999)].

The Government as a Runaway Train: Neo-institutional Economics (NIE) Concerns with the Institutions of Public Governance

Shah and Shah (2006) apply NIE principles in developing a framework for analysing fiscal systems and local empowerment and for comparing mechanisms for local governance. This framework is helpful in designing multiple orders of government and in clarifying local government responsibilities in a broader framework of local governance. According to the NIE framework as interpreted by Shah and Shah (2006), various orders of governments (as agents) are created to serve the interests of the citizens as principals. The jurisdictional design should ensure that these agents serve the public interest while minimising transaction costs for the principals.

The existing institutional framework does not permit such optimisation, because the principals have bounded rationality; that is, they make the best choices on the basis of the information at hand but are ill informed about government operations. Enlarging the sphere of their knowledge entails high transaction costs, which citizens are not willing to incur. Those costs include participation and monitoring costs, legislative costs, executive decision-making costs, agency costs or costs incurred to induce compliance by agents with the compact, and uncertainty costs associated with unstable political regimes [Horn (1997); Shah (2005)]. Agents (officials of various orders of governments) are better informed about government operations than principals are, but they have an incentive to withhold information and to indulge in opportunistic behaviours or "self-interest seeking with guile" [Williamson (1985), p. 7]. Thus, the principals have only incomplete

contracts with their agents. Such an environment fosters commitment problems because the agents may not follow the compact. The situation is further complicated by three factors—weak or extant countervailing institutions, path dependency, and the interdependency of various actions. Countervailing institutions such as the judiciary, police, parliament, and citizen activist groups are usually weak and unable to restrain rent-seeking by politicians and bureaucrats. Historical and cultural factors and mental models by which people see little benefits to and high costs of activism prevent corrective action. Further, empowering local councils to take action on behalf of citizens often leads to loss of agency between voters and councils, because council members may interfere in executive decision making or may get co-opted in such operations while shirking their legislative responsibilities. The NIE framework stresses the need to use various elements of transaction costs in designing jurisdictions for various services and in evaluating choices between competing governance mechanisms.

Local Government as a Facilitator of Network Forms of Local Governance

Given the high transaction costs and perceived infeasibility of market and hierarchical mechanisms of governance for partnerships of multiple organisations, a network mechanism of governance has been advanced as a possible mode of governance for such partnerships—the kind to be managed by local governments. The network form of governance relies on trust, loyalty, and reciprocity between partners with no formal institutional safeguards. Networks formed on the basis of shared interests (interest-based networks) can provide a stable form of governance if membership is limited to partners that can make significant resource contributions and if there is a balance of powers among members. Members of such networks interact frequently and see cooperation in one area as contingent on cooperation in other areas. Repeated interaction among members builds trust. Hope-based networks are built on the shared sentiments and emotions of members. Members have shared beliefs in the worth and philosophy of the network goals and have the passion and commitment to achieve those goals. The stability of such networks is highly dependent on the commitment and style of their leadership [Dollery and Wallis (2001)] and the catalytic and mediating role played by local governments.

LG as a Facilitator of Network Forms of Local Governance

A Synthesis: Reshaping the Role of Local Governments for the 21st Century

We have reviewed ideas emerging from the literature on political science, economics, public administration, law, federalism, and the NIE with a view to developing an integrated analytical framework for the comparative analysis of local government and local governance institutions. The dominant concern in this literature is that the incentives and accountability framework faced by various orders of government is not conducive to a focus on service delivery consistent with citizen preferences. As a result, corruption, waste, and inefficiencies permeate public governance. Top-down hierarchical controls are ineffective; there is little accountability because citizens are not empowered to hold governments accountable.

Multi-order governance practices around the world are focused on structures and processes, with little regard for outputs and outcomes. These practices support top-down structures with preeminent federal legislation (that is, federal legislation overrides any sub-national legislation). The central government is at the apex, exercising direct control and micromanaging the system. Hierarchical controls exercised by various layers of government have an internal rule-based focus with little concern for their mandates. Government competencies are determined on the basis of technical and administrative capacity, with almost no regard for client orientation, bottom-up accountability, and lowering of transaction costs for citizens. Various orders of government indulge in uncooperative zero-sum games for control. This tug of war leads to large swings in the balance of powers. Shared rule is a source of much confusion and conflict, especially in federal systems. Local governments are typically creatures of states or provinces and given straitjacket mandates. They are given only limited home rule in their competencies. In short, local governments in this system of "federalism for the governments, by the governments, and of the governments" get crushed under a regime of intrusive controls by higher levels of governments. Citizens also have limited voice and exit options.

The governance implications of such a system are quite obvious. Various orders of government suffer from agency problems associated with incomplete contracts and undefined property rights, as the assignment of taxing, spending, and regulatory powers remains to be clarified—especially in areas of shared rule. Intergovernmental bargaining leads to high transaction costs for citizens. Universalism and pork-barrel politics result in a tragedy of commons, as various orders of government compete to claim a higher share of common pool resources. Under this system of governance, citizens are treated as agents rather than as principals.

On how to reverse this trend and make governments responsive and accountable to citizens, the dominant themes emphasised in the literature are the subsidiarity principle, the principle of fiscal equivalency, the creation of public value, results-based accountability, and the minimisation of transaction costs for citizens, as discussed earlier. These themes are useful but should be integrated into a broader framework of citizen-centred governance, to create an incentive environment in the public sector that is compatible with a public sector focus on service delivery and bottom-up accountability and also incentive- compatible with globalisation. Such integration is expected to deal with the commitment problem in various levels of government by empowering citizens and by limiting their agents' ability to indulge in opportunistic behaviour. Table 2 provides general principles for rethinking the role of local government based upon a synthesis of the conceptual and empirical literature.

Table 2

The Role of a Local Government under the New Vision of Local Governance

Old View: 20th century	New View: 21st century
Is based on residuality and local governments as wards of the state	Is based on subsidiarity and home rule
Is based on principle of ultra vires	Is based on community governance
Is focused on government	Is focused on citizen-centred local governance
Is agent of the central government	Is the primary agent for the citizens and leader and gatekeeper for shared rule
Is responsive and accountable to higher-level governments	Is responsive and accountable to local voters; assumes leadership role in improveing local governance
Is direct provider of local services	Is purchaser of local services
Is focused on in-house provision	Is facilitator of network mechanisms of local governance, coordinator of government providers and entities beyond government, mediator of conflicts, and developer of social capital
Is focused on secrecy	Is focused on letting the sunshine in; practices transparent governance
Has input controls	Recognises that results matter
Is internally dependent	Is externally focused and competitive; is ardent practitioner of alternative service delivery framework
Is closed and slow	Is open, quick, and flexible
Has intolerance for risk	Is innovative; is risk taker within limits
Depends on central directives	Is autonomous in taxing, spending, regulatory, and administrative decisions
Is rules driven	Has managerial flexibility and accountability for results
Is bureaucratic and technocratic	Is participatory; works to strengthen citizen voice and exit options through direct democracy provisions, citizens' charters, and performance budgeting
Is coercive	Is focused on earning trust, creating space for civic dialogue, serving the citizens, and improving social outcomes
Is fiscally irresponsible	Is fiscally prudent; works better and costs less
Is exclusive with elite capture	Is inclusive and participatory
Overcomes market failures	Overcomes market and government failures
Is boxed in a centralised system	Is connected in a globalised and localised world

Source: Shah and Shah (2006, 2007).

The framework emphasises reforms that strengthen the role of citizens as the principals and create incentives for government agents to comply with their mandates. The commitment problem may be mitigated by creating citizen-centred local governance—by having direct democracy provisions, introducing governing for results in government operations, and reforming the structure of governance, thus shifting decision making closer to the people. Direct democracy provisions require referenda on major issues and large projects and require that citizens have the right to veto any legislation or government program. A "governing for results" framework requires government accountability to citizens for service delivery performance. Hence, citizens have a charter defining their basic rights as well as their rights of access to specific standards of public services. Output-based intergovernmental transfers strengthen compliance with such standards and strengthen accountability and citizen empowerment. Formula based revenue sharing arrangements, on the other hand, weaken government accountability to citizens.

Implications for Division of Powers Within Nations: Role Reversals for Central, Provincial and Local Governments

The framework described above has important implications for reforming the structure of government. Top-down mandates on local governance will need to be replaced by bottom-up compacts. Furthermore, the role of local government must be expanded to serve as a catalyst for the formulation, development, and operation of a network of both government providers and entities beyond government. Local government's traditionally acknowledged technical capacity becomes less relevant in this framework. More important are its institutional strengths as a purchaser of services and as a facilitator of alliances, partnerships, associations, clubs, and networks for developing social capital and improving social outcomes. Two distinct options are possible in this regard, and both imply a pivotal role for local governments in the intergovernmental system. The options are (a) local government as the primary agent, subcontracting to local providers, provincial/regional (state), and federal or central government authorities and engaging networks and entities beyond government, and (b) local, provincial/regional (state), and national governments as independent agents.

Option A: Local Governments as Primary Agents of Citizens. In this role, a local government serves as (a) a purchaser of local services, (b) a facilitator of networks of government providers and entities beyond government, and (c) a gatekeeper and overseer of province/state (intermediate order) and national governments for the shared rule or responsibilities delegated to them. This role represents a fundamental shift in the division of powers from higher to local governments. It has important constitutional implications. Residual functions reside with local governments. Provincial legislatures would not be directly elected and would simply be constituted from local government representatives to perform inter-municipal services. The provincial chief executive (governor) could either be directly elected or nominated by the Centre subject to confirmation by the provincial legislature (provincial council). The provincial council will make policies on inter-local issues and provide oversight on the provincial executive headed by the governor. The governor could be removed by a three-fourth majority of the provincial council. In Finland—a country with no provincial (intermediate order) governments—

inter-municipal functions are performed through voluntary partnerships among local governments. The national government is assigned redistributive, security, foreign relations, and interstate (inter-regional) functions such as harmonisation and consensus on a common framework. The Chinese and the Swiss systems bear some affinity to this model and Finland incorporates elements of this framework.

Option B: Various Orders of Government as Independent Agents. An alternative framework for establishing the supremacy of the principals is to clarify the responsibilities and functions of various orders as independent agents. This framework limits shared rule. Finance follows function strictly, and fiscal arrangements are periodically reviewed for fine-tuning. Local governments enjoy home rule, with complete tax and expenditure autonomy. The Brazilian fiscal constitution incorporates some features of this model, albeit with significant deviations.

Feasibility of Options. Option A is well grounded in the history of modern governments and is most suited for countries with history of internal or external conflict in recent times. It is already practiced to some degree in Switzerland, Finland, Denmark, Sweden, and China. War, conquest, and security concerns have led to a reversal of the roles of various orders of governments and to a reduction in local government functions in more recent history. Globalisation and the information revolution have already brought pressures for much larger and stronger roles for local governments. Although a majority of governments have done some tinkering with their fiscal systems, the radical change recommended here is not in the cards anywhere. This is because the unlikelihood of overcoming path dependency—a tall order for existing institutions and vested interests—makes such reform infeasible. Under such circumstances, option B may be more workable, but here the clarity of responsibilities may not be politically feasible. In general, there is unlikely to be political will to undertake such bold reforms. Piecemeal adaptation of this model will nevertheless be forced on most countries by the effects of globalisation and by citizen empowerment, facilitated by the information revolution.

The Practice of Local Governance and Lessons for Reform

The legal status of local government varies across countries, with local government deriving authority from national constitutions in Brazil, Denmark, France, Germany, Korea, the Netherlands, and Sweden; from state constitutions in Australia, Switzerland, and the United States; and from national legislation in the United Kingdom and New Zealand and from provincial legislation in Canada and Pakistan and from executive order in China. It is interesting that there is no clear pattern in the autonomy and range of local services provided by local governments deriving their status from national and state constitutions. However, local governments that are created through legislation are significantly weaker.

The relative importance of local governments is compared in Figure 1 using local government share of consolidated public sector expenditures. Using this indicator, Japan, South Korea, China, Denmark are the leaders; Indonesia, Thailand, USA, UK, Poland, France, Phillipines, and Brazil are in the mid range; Pakistan, Australia and India are in the lowest range. Considering another indicator i.e. local government share of GDP, local government in Denmark stands out, claiming about 50 percent of total expenditures, which account for about 30 percent of GDP. Among the industrial countries, Australia is an outlier with local expenditures accounting for less than 3 percent of GDP.

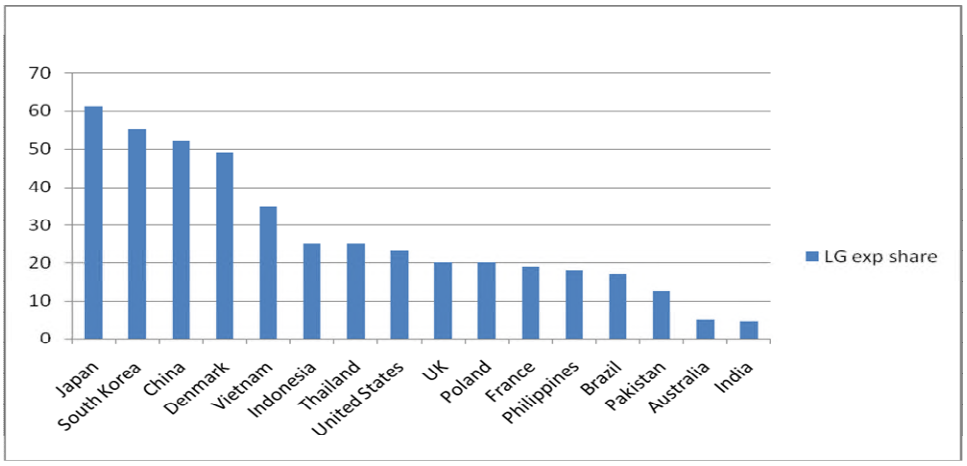


Fig. 1. The Rising Tide of Local Governance—2010

Relative importance of local government is quite small and local government role in local economic development is quite weak in Australia ("roads and rubbish" only), India (largely ornamental), Pakistan, France and United Kingdom. In these countries local governments were seen in the past more as instruments of political participation rather than autonomous institutions for self-government and service provision. This view has been reshaped to give greater autonomy to local governments in municipal services in recent years in UK and France. Local governments are relatively more important and play a moderate role in local economic development in Japan, Germany, Canada, USA and Brazil. In these countries, local governments have an exclusive role in municipal services but limited role in social services. The role of local government is expansive in Nordic countries (Denmark, Norway, Sweden and Finland), Switzerland and China. In Nordic countries, local governments act as the primary agent of citizens and provide a broad role in support of a client-oriented welfare state. For example, in Finland, local governments assume a predominant role in social services [Moisio, Loikkanen, Oulasvirta (2010)]. In Switzerland cantons (higher order of local governments) enjoy autonomy not only in fiscal matters but also in such areas as immigration, citizenship, language and foreign economic relations. China affords its local governments one of the strongest role in local economic development. Local governments below provincial level employ 89 percent of the public workforce and command 51 percent of public expenditures. A unique feature of local government in China is that local autonomy varies directly with success in local performance as measured by local economic development, service delivery and citizen satisfaction. Nordic countries, Switzerland and China appear to have local government role more consistent with the demands of new world economic order. In these countries, intermediate orders of government have limited (China) or no role (Nordic countries).

Some Lessons

Historical evolution and the current practice of local governance is instructive in drawing lessons for reform of local governance. There is great diversity in practice in local governance in industrial countries, but there are also some common strands. The

diversity is in the institutional arrangements, which have evolved incrementally over a long period. This evolution has resulted in diverse roles for local governments and diverse relations with central governments across countries. In Nordic countries, local government serves as the primary agent of the people, whereas in Australia, that role is entrusted to state governments, and local government has a minimal role in local affairs.

There is no uniform model for local government size, structure, tiers, and functions across OECD countries. There are nevertheless a number of interesting common features. First, most countries recognise that finance must follow function to ensure that local governments are able to meet their responsibilities efficiently and equitably. Second, home rule is considered critical to meeting local expectations and being responsive to local residents. Therefore, local governments must have significant taxing, spending, and regulatory autonomy, and they must have the ability to hire, fire, and set terms of reference for employees without having to defer to higher levels of governments. Only then can local governments innovate in management by introducing performance-based accountability and innovate in service delivery by forging alternative service delivery arrangements through competitive provision, contracting, and outsourcing wherever deemed appropriate as done in Finland [see Moisio, Loikkanen, and Oulasvirta (2010)]. They can also facilitate a broader network of local governance and harness the energies of the whole community to foster better social outcomes. Third and most important, accountability to local residents has been the factor most critical to the success of local governance in industrial countries. This accountability is strengthened through democratic choice, participation, transparency, performance budgeting, citizens' charters of rights, and various legal and financing provisions that support wider voice, choice, and exit options to residents.

In conclusion, a synthesis of the conceptual literature suggests that the modern role of a local government is to deal with market failures as well as government failures. This role requires a local government to operate as a purchaser of local services, a facilitator of networks of government providers and entities beyond government, and a gatekeeper and overseer of province/state and national governments in areas of shared rule. Local government also needs to play a mediator's role among various entities and networks to foster greater synergy and harness the untapped energies of the broader community for improving the quality of life of residents. Globalisation and the information revolution are reinforcing those conceptual perspectives on a catalytic role for local governments. This view is also grounded in the history of industrial nations especially Nordic countries and ancient civilisations in China, India and Pakistan. Local government was the primary form of government until wars and conquest led to the transfer of local government responsibilities to central and provincial/regional governments. This trend continued unabated until globalisation and the information revolution highlighted the weaknesses of centralised rule for improving the quality of life and social outcomes. The new vision of local governance (Table 2) presented here argues for a leadership role by local governments in a multi-centred, multi-order, or multi-level system. This view is critical to creating and sustaining citizen-centred governance, in which citizens are the ultimate sovereigns and various orders of governments serve as agents in the supply of public governance. This view is also relevant for carving and sustaining a competitive edge in international economic relations as demonstrated by the recent experience of China.

Empowering local governments and strengthening their role in local economic development ushered China in an era of sustained economic growth and lifting billions out of the poverty trap.

Box 2

China is Shining on the World Economic Stage—Thanks to Its Unshackling of Its Local Governments

China is an economic powerhouse poised to assume world economic leadership in the coming decades. It had a sustained record of economic growth (average annual growth rate in real per capita GDP of 10 percent over the past three decades resulting in nearly tripling of per capita income from 1978 to 2010) and prosperity. Its record in alleviating poverty is unparalleled in the economic history of the world – reducing poverty headcount rate from 31 percent in 1978 to less than 2 percent in 2008. These facts are well known. But what is less well known is that this came about because Deng Shao Peng in 1979 unshackled local governments and unleashed their innovative spirits and energies in pursuit of economic growth and local economic development. China has one of the most empowered local governments serving their residents from cradle to grave. Local Government command 89 percent share of public sector employment and 51 percent share of consolidated public expenditures. Other than defense, debt and foreign affairs that are the exclusive domain of the Centre, all other functions including education, health, and social insurance are the responsibility of local governments. There is no uniform model and all local governments pursue their own unique approach to service delivery and local economic development. Contracting out service delivery to autonomous service units is practiced widely. Provincial role is largely limited to agriculture and providing coordination and oversight of local governments on behalf of the centre. Thus China while having a unitary constitution bears affinity to an hour glass model of federalism. There is strict government accountability to citizens at all orders through directly elected people's congress at each level. In addition, the Communist Party oversight committees at each level monitor citizen satisfaction as well as dissatisfaction (number of protests). Higher level oversight of local governments is based on objective results based criteria that incorporates: (a) local economic development performance; (b) local service delivery performance; and (c) citizen satisfaction. Local government success is rewarded by greater local autonomy and sustained failure is punished by reduced autonomy and intrusive oversight and controls by higher order governments.

Source: Qiao and Shah (2006).

4. EMPIRICAL PERSPECTIVES ON ALTERNATE MODELS OF DIVISION OF POWERS AMONG PROVINCES AND LOCAL GOVERNMENTS AND THEIR IMPLICATIONS FOR GOOD GOVERNANCE AND GROWTH

Earlier sections presented normative, institutional and historical perspectives on the newer roles of provincial and local governments. It argued for leaner role of the provinces and an expansive role of local governments to comply with the new world economic order. This section attempts to supplement the analytical perspectives presented in earlier sections with empirical evidence on the implications of alternate roles for good governance and growth. Using a worldwide sample of countries, this section

attempts to compare economic performance with different strengths of state and local governments. The conjecture is that for good governance and growth, decentralisation of government authority to local government is more important than decentralisation to intermediate tiers i.e. provinces or states.

For our analysis we group countries according to the roles assumed by state and local governments. State governments are classified as strong or weak depending upon expansive or limited range of functions assigned to them. Local governments on the other hand are ranked on a scale of weak , fair and strong governance based upon their share of national expenditure adjusted for the degree of political, administrative and fiscal autonomy they enjoy [for methodological details, see Ivanyna and Shah (forthcoming)]. With a few notable exceptions, data shows that strong and fair local governance is usually associated with weak state governments (see Annex Table 1) and strong state governments typically imply weak local governments.

Once classified in this way, group averages are then calculated on 11 good governance and growth indicators for the period 1999–2008. These indicators include: GDP per capita, GDP per capita growth rate, central government debt as a percent of GDP, human development index, perceived corruption, incidence of internal conflicts, citizen centric indexes of responsive governance (government delivers services consistent with people preferences), fair governance (protects minority and disadvantaged groups), responsible governance (costs less) and accountable governance (accountable to citizens) and durability of political system. In 10 out of these eleven indicators, countries with strong local governments and weak state governments do better than countries with strong state governments. The only exception is fair governance—a higher order task best assigned to central government (see Figures in the Annex).

Econometric Analysis

We explored further the relationship of alternate roles of state and local governments using regression analysis. Such an analysis allows control for many other factors affecting a country's economic and governance performance and isolate the impact of alternate models of division of powers. The results of these analyses are presented in Annex Tables 2 and 3. The results reconfirm our qualitative and simple quantitative analysis findings. Strong local governments have positive association with economic performance and quality of governance indicators in 9 out of 12 performance indicators though not all of the relationships are statistically significant. Having strong state government helps only in 1 out of 12 cases while it hurts in four cases. Thus while the data limitations prevent us from more thorough empirical analysis of these choices, the results presented here provide tentative support to the basic hypothesis of this paper that strong local governments accompanied by leaner provincial/state governments are needed to improve economic and social outcomes for citizens.

5. CONCLUDING REMARKS: ADAPTING TO A CHANGING WORLD

This paper has reflected on the unfinished agenda for the reform of multi-order governance. Broad contours of the reform include freeing local governments from shackles of centralised and provincialised control so as to enable them to assume a leadership role in improving economic and social outcomes for local residents. This leadership role requires

local governments to assume a catalyst's role in directing and coordinating governmental (including central government) and non-governmental agencies and networks to local economic development. Local governments would be in a position to play this role if their responsibilities are determined by home rule and community governance principles and they have adequate access to revenues from own sources or they can piggyback on central tax bases. In addition to strengthen their accountability to local residents not only finance should follow function but intergovernmental finance should be structured so as to strengthen local autonomy while enhancing results based accountability. Thus there is a need to move away from manna from heaven transfers (general revenue sharing schemes) to output-based (performance oriented) grants that respect local autonomy while creating incentives for service delivery performance accountability [see Shah (2010)]. There is also need for reform of the budgetary institutions so that all orders of government are bound by a common framework of fiscal responsibility, integrity, fiscal discipline and fiscal sustainability. There should also be a framework to ensure that local government performance is measured and monitored for compliance with the principles of responsive and fair, responsible and accountable governance.

Intermediate order governments have limited economic relevance in this framework but can usefully play a coordinating role for inter-local services. The paper has also argued that while there is a strong case for directly elected central and local governments, in the interest of restraining government expenditures, provincial councils (assemblies) can be constituted simply from elected heads of local governments and provincial chief executives can either be directly elected by people or appointed by the Centre subject to confirmation by the provincial council. The provincial council determines policies on inter-local functions and also provides oversight on the provincial executive headed by the provincial governor that implements these mandates. Such a framework minimises costs of intergovernmental coordination while reducing transactions costs for citizens to hold governments to account. Analytical, institutional and empirical analysis presented in this paper further shows that such a framework of multi-order governance is conducive to minimising internal conflicts while promoting good governance and growth. The paper has, however, recognised that such a reform agenda may not be feasible in some countries with dual federalism where provinces (states) have strong political clout and are governed by elites. This is because of the unlikelihood of overcoming path dependency—a tall order for existing institutions and vested interests to wither away—makes such reform infeasible. Under such circumstances, there is unlikely to be political will to undertake such bold reforms. In these countries, citizen activism would be required to build consensus for such fundamental reforms. Such activism is, however, unlikely to materialise in the absence of educated and enlightened citizenry. Therefore, such radical reforms would not be in the cards in the foreseeable future.

Our survey of the literature also suggests that local governance even in most industrial countries does not fully correspond to the governance principles enunciated here or even to the needs of economic success in this information age. There are only few exceptions and these are found mostly in Nordic countries and in East Asia (China, South Korea and Japan). Other countries would be well advised to follow the lead of these countries in adapting multi-order governance especially local governance to the needs of the 21st century.

Appendices

Table 1

Countries Grouped by Strength of Local and State Governments

Strong SG	ETH, NPL, MYS, MEX, VEN, IND, AUS, ARG, BIH, PAK, BEL, SDN	AUT, DEU, BRA	USA, CAN
Weak SG	Rest of the World	TZA BOL ECU KOS KGZ EST BGR ALB PHL URY NZL SRM TJK LUX TWA PER PRT KAZ SVK ZAF BLR IRL CZE ESP MNG ROM UZB LTU	LTU, NLD, LVA POL UKR NGA GBR HUN BUS CUB GEO FRA IDN COL CHE JPN ITA KOR ISL NOR FIN SWE CHN DNK
	Weak LG	Fair LG	Strong LG

Note: Abbreviations: SG – state government, LG – local government. Division by strength of SG: based on opinion of WB experts. Division by strength of LG: strong LG – share of own local expenditures is more than 10 percent of government expenditures, fair LG – the share is between 5 percent and 10 percent, weak LG – the share is less than 5 percent.

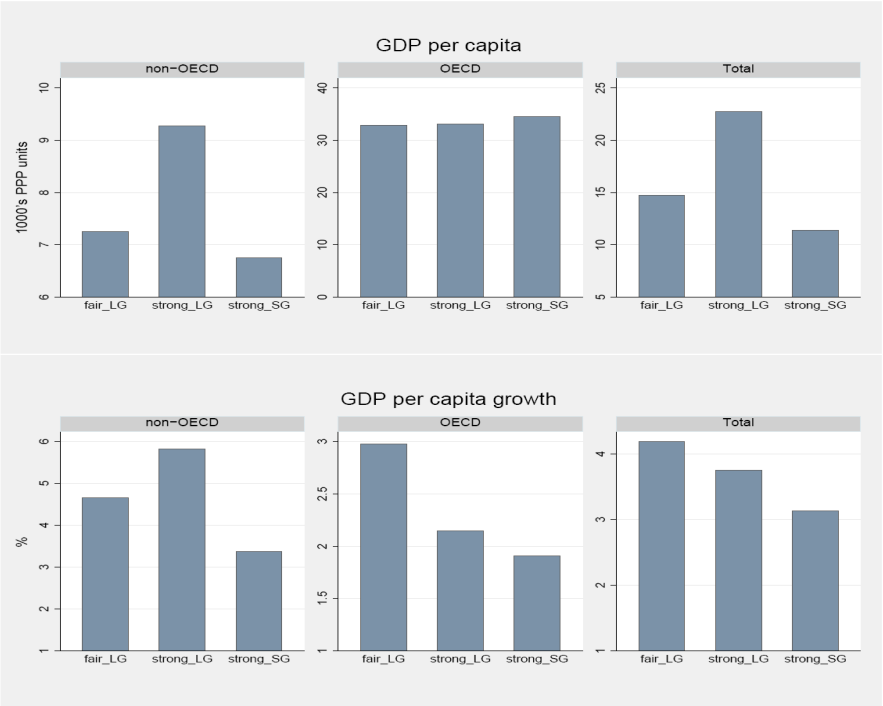


Fig. 1. State Governments vs. Local Governments: Comparing Averages

Note Definitions: GDP per capita – 2008, PPP Units, datasource – WDI; *GDP per capita growth* – real average 1999–2008, datasource – WDI.

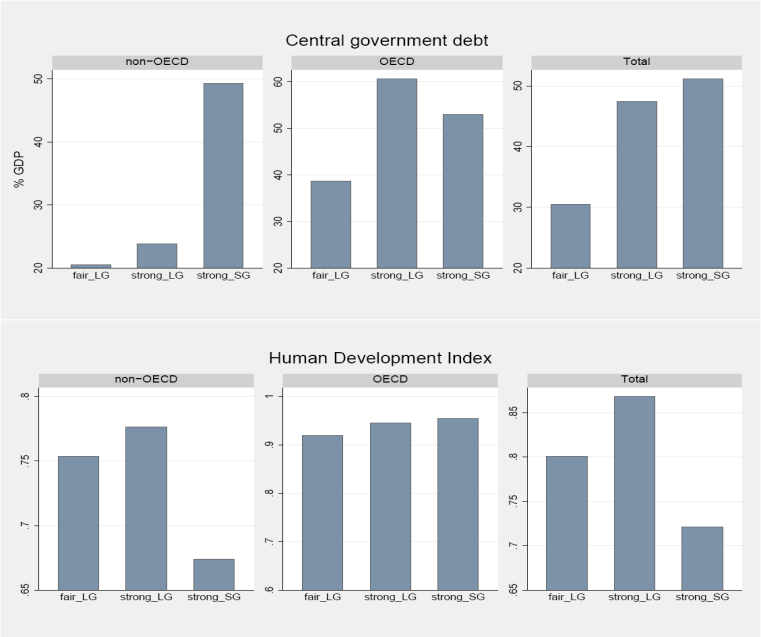


Fig. 2. State Governments vs. Local Governments: Comparing Averages

Note Definitions: Central government debt – 2008, % GDP, datasource – WDI; *Human Development Index* – 2005, datasource – UNDP.

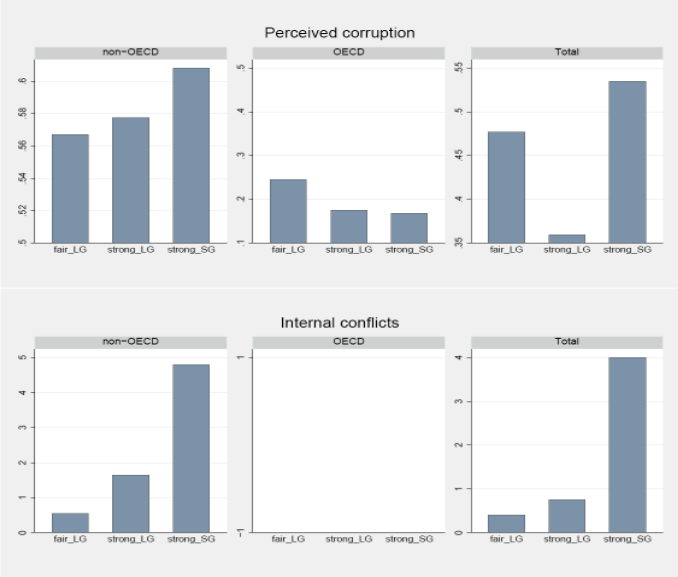
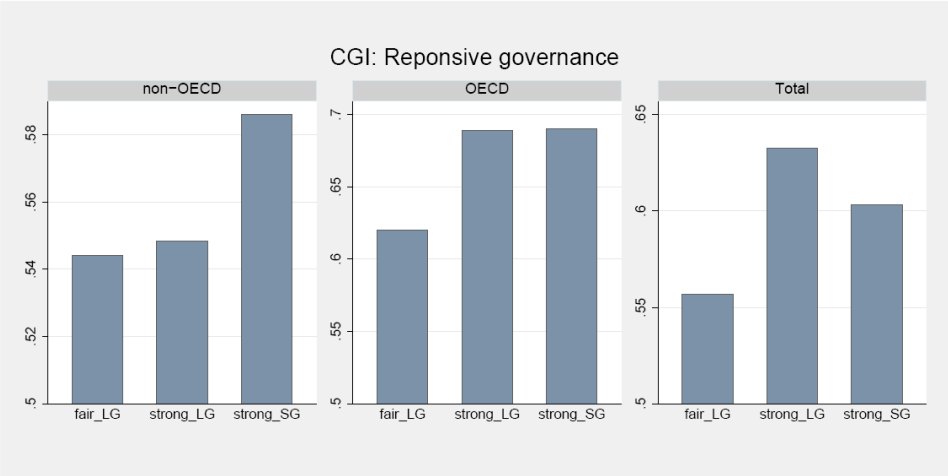


Fig. 3. State Governments vs. Local Governments: Comparing Averages

Note Definitions: Perceived corruption – average 1999–2008, datasource – WGI, linear transformation; *Number of internal conflicts* – 2005, violent conflicts where 3 or more persons died, datasource – Uppsala Peace Institute.

Fig. 4. Citizen Centric Governance Indicator: Responsive Governance
(*Source:* basic data from Ivanyna and Shah, 2009)



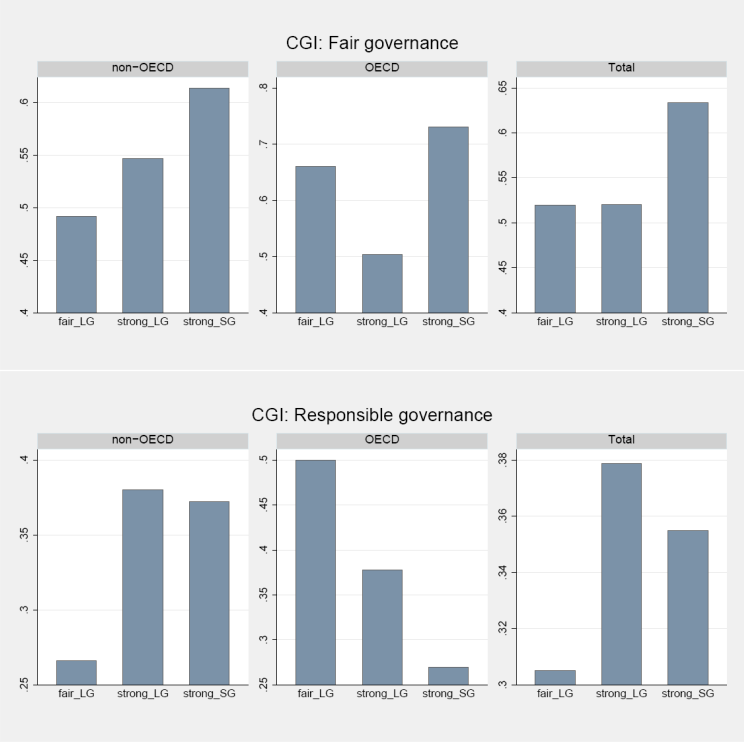


Fig. 5. State Governments vs. Local Governments: Comparing Averages

Note Definitions: Fair governance – 2005–2008, datasource – Ivanyna and Shah (2009); *Responsible governance* – 2005–2008, datasource – Ivanyna and Shah (2009).

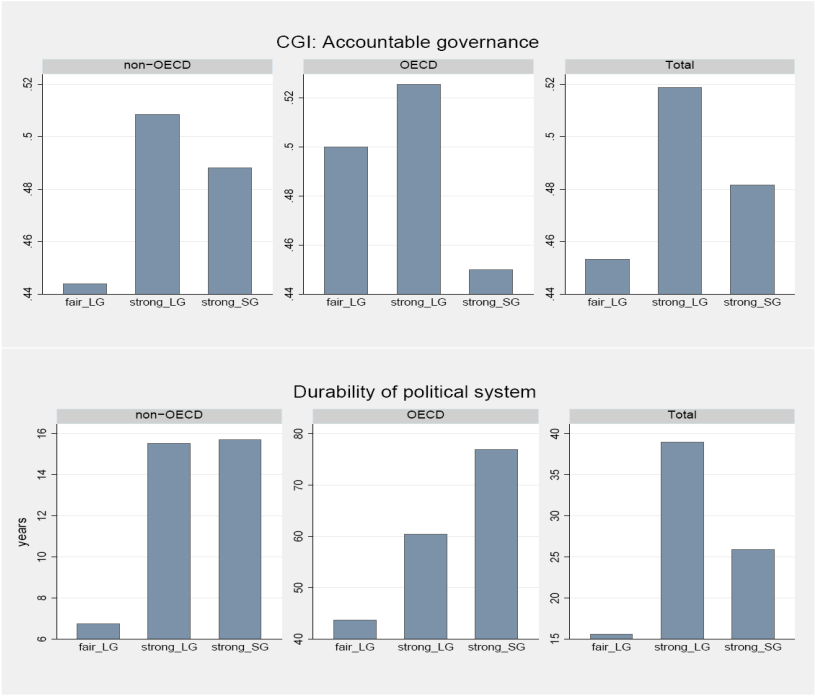


Fig. 6. State Governments vs. Local Governments: Comparing Averages

Note Definitions: Accountable governance – 2005–2008, datasource – Ivanyna and Shah (2009); *Durability of political regime* – 2005, datasource – Polity IV project.

Table 2

State vs. Local Governments: Regressions

	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Dep. Variable	Gdp-cap	Gdp-growth	Debt	Hdi	Corr	Conf
Own LG Exp.	3.47***	8.05*	–114.11**	0.48**	–0.17	6.63
	(1.16)	(4.35)	(49.36)	(0.19)	(0.16)	(4.42)
1=SG is Strong	0.39	0.27	–7.66	0.06*	0.00	2.83
	(0.26)	(0.60)	(14.57)	(0.03)	(0.03)	(1.84)
Product	6.99*	6.99	195.53	1.01*	–0.86**	–35.59
	(3.86)	(10.27)	(155.84)	(0..54)	(0.42)	(33.04)
Observations	110	116	37	116	116	116
R-squared	0.707	0.244	0.623	0.673	0.741	0.249

Note: *significant at 10 percent level, ** – significant at 5 percent level, *** – significant at 1 percent level, Years analysed in all regression—1999–2008. Dependent variables: *gdp_cap*–GDP per capita, *gdp_growth*–GDP per capital growth, *debt*–central government debt, *hdi*–Human Development Index, *corr* – perceived corruption, *confl*–number of internal conflicts. See previous Section for definitions of dependent variables. Righ hand side variables – *own LG expenditures, SG strength*–both defined in the previous Section–and their product. Other variables included as controls in all regressions: UK legal origin, number of tiers of sub-national government, government consumption, openness, number of procedures needed to open business, number of days needed to enforce contract, Freedom House index of political and civil rights, ethnical and religious fractionalisation. Estimation method in all regressions: OLS. Standard errors are heteroscedasticity robust.

Table 3

State vs. Local Governments: Regressions

Dep. Variable	(i) Cgi	(ii) r-ve gov	(iii) Fair gov	(iv) r-le gov	(v) acc-gov	(vi) Dur
Own LG Exp.	0.14	–0.08	0.28	0.24	–0.18	55.04
	(0.21)	(0.26)	(0.49)	(0.26)	(0.25)	(40.81)
1=SG is Strong	–0.00	–0.02	0.01	–0.07	–0.10*	8.98
	(0.06)	(0.06)	(0.10)	(0.06)	(0.05)	(11.30)
Product	–0.26	–0.02	–0.17	–0.68	0.09	562.57**
	(0.73)	(0.86)	(1.25)	(0.85)	(0.71)	(236.40)
Observations	41	41	41	41	41	115
R-squared	0.318	0.395	0.202	0.405	0.473	0.560

Note: *significant at 10 percent level, ** – significant at 5 percent level, *** – significant at 1 percent level, Years analysed in all regression—1999–2008. Dependent variables: *cgi* – Citizen-centric Governance Indicator, *r-ve gov* – Responsible Governance, *fair gov* – Fair Governance, *r-le gove* – Responsible Governance, *acc_gov* – Accountable Governance, *dur* – durability of political regimes. See previous Section for definitions of dependent variables. Righ hand side variables – *own LG expenditures, SG strength* – both defined in the previous Section – and their product. Other variables included as controls in all regressions: UK legal origin, number of tiers of sub-national government, government consumption, openness, number of procedures needed to open business, number of days needed to enforce contract, Freedom House index of political and civil rights, ethnical and religious fractionalisation. Estimation method in all regressions: OLS. Standard errors are heteroscedasticity robust.

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Comments

It is indeed an honour for me to be a discussant on the Gustav Ranis Lecture organised by PIDE. Gustav Ranis has played an important role in the initial phase of development of Pakistan Institute of Development Economics (PIDE) as research institution. The Gustav Ranis lecture by Dr Anwar Shah is a philosophical thought provoking lecture. To be a discussant on this important lecture, I have tried to study all these philosophies. I congratulate Dr Shah for making this valuable contribution. As a student of development economics, my concerns are as follows:

The paper is providing an extensive review of literature on whether the multi-facet governments are functioning well or not? Whether you want to reduce the tiers of government? What is the role of provincial level governments? If we retain this tier of government what role it can play to get desired economic outcomes? The historical perspective presented in the paper informs us that initially small governments, small states prevailed. The greed for holding control of more and more countries and more and more space, led to wars and resulted in big governments and countries. Now we have to go back to the old localised system of governance. My concern here is: Was greed the only reason? How successful were these small governments? What were the weaknesses of the local level governments leading to their failure? Currently what is the experience of different countries opting for the local level governance? How far we can learn from these examples? This discussion is missing in the paper.

My second concern is: What is the role of level of economic development for the success of localised system of governance? It may be the case that If a country achieves certain level of economic growth and prosperity then involving more and more citizens in the decision making process may be more effective as compared to in the initial stages of economic development. What I would like to know from Dr Shah, because he is an authority in this area, that whether the initial economic conditions are important for the success of devolution of economic power or not.

Thirdly, what are the prerequisites like the capabilities and capacities of those who will be the decision makers so that we do not face the failure in this new experiment? What will be required in terms of resource base at the local level to translate power into actions? Unless there is financial backing the new form of governance will not be able to deliver. If you look into different districts of Pakistan, in terms of resources, in terms of income inequality, in terms of incidence of poverty, wide disparities exist. In some cases these disparities have been persistent over time. South Punjab has been the poorest of regions in Pakistan. Now what it will take to bring back those districts out of poverty; whether making them locally empowered will be sufficient or whether a resource transfer will be needed from somewhere, whether it is from the provincial level or directly from the federal level to empower them, to give them initial support to make the decisions so

that they can come out of this persistent poverty situation. The most important and effective local governments have been in terms of provision of education and health services. In addition, local governments have been effective wherever the capacity and the capability of the local decision makers is ensured. In Pakistan, the capacity and capability is critically lacking affecting the performance of local governments.

Next issue is what type and quality of institutions. Which institutions are critical for the success of experiment? This dimension is missing in this paper. Dr Shah is saying that the central system is not working and it is basically the failure of management. How we can improve this management system/management practices so that we do not have the failure of another system? This is important as the change from the centralised system to the local government will involve, initially, huge transactions costs. Who will bear that cost and how you can minimise it? These issues become critically important when you want to translate this idea, of moving away from the central government to the local government, into action.

Dr Shah has given the example of China. China has been studied and quoted widely these days. Chinese economic growth is not just that what is the form of government, a number of other factors or primary factors and implementation of incentive systems of production also played a critical role. Can we replicate it?

In terms of econometric results, I think, Dr Shah himself has some reservations. The data used are not explained. Given the methodology, it can not be claimed that Dr Shah's philosophy is supported. There are a number of insignificant coefficients. The estimation technique is also not appropriate.

Next issue is that the local governments can be very effective in some cases, and in some areas, and Dr Shah is focusing on control on expenditure. What about the revenue generation? What is the share of different level of local governments in terms of revenue generation and how much transfer would be required to improve performance economically and socially? That is an important issue.

Lastly, the local governments may be effective in terms of delivering some services but the role of the central government or the provincial government is also important in some areas. For example, in this era when the world is facing threats of climate change requiring global actions, how far the local governments will be effective in terms of generating incentives and to control disadvantage or disasters of climate change. It needs global action which require support from the central and provincial governments.

In the end, I would congratulate, Dr Shah for presenting this paper for Gustav Ranis Lecture and thank PIDE for giving me this opportunity.

Rehana Siddiqui

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Comments

This is a provocative and thought provoking paper. It is also particularly useful for those of us who mostly dwell on issues related to Pakistan's and do not focus on the big picture and new developments that are taking place elsewhere. I will first talk a little bit about some of the interesting concepts that have been presented in the paper and then relate it to the situation prevalent in Pakistan.

'Glocalisation': Relevance and Contradictions Within

The first important issue that the paper raises is from a stream of literature referred as 'glocalisation'—integration of the local economy with the global. The impulse created by the information revolution and liberalisation of markets at the global level have come together in some parts of the world with sub-regional economies to create a new and dynamic developmental impulse. The possibility of reaping benefits at the local level of global opportunity would be directly proportional to the level of human capital and knowledge base that exists at whatever the level of disaggregation we wish to refer as 'local'.

Now let us see the relevance of this particular model in our context. Obviously, the human capital base at the local level by and large is extremely weak. Thus the possibilities that exist in small town Germany or even in most South American countries are rarely prevalent, not only in Pakistan, but in the South Asian context in general. Secondly, in many ways Pakistan as a whole has not reaped the benefits of globalisation even at the aggregate level. FDI flows and trade integration in the region or beyond for Pakistan are below par when compared to other mainstream globalisers. This is in no way a critique of the concept, only an attempt to place ourselves in the larger scheme.

It is also pertinent to mention skepticism about some processes of globalisation itself; especially about the impact of global financial markets. The big picture at this point in time it is not very encouraging. A house is mortgaged in small town Kentucky or Louisiana in the US and a small Housing and Loans bank goes bust. A trillion dollars have to be injected by the central government to bail out that economy but even then the ripples of this catastrophe are felt across the global economy for years to come.

Dr Shah refers to the present financial crisis as an aberration in the relentless march towards globalisation. The other view is that these are recurring crisis and not aberrations with huge, economic as well as social costs, particularly for the poor.

Human Capital or Resource Based Development?

Returning to the theme of glocalisation and the Pakistani context, it appears that Pakistan may be some nothches behind the post modern glocalisation formulation mentioned in the paper. In fact one very interesting and important point is made in Table 1 in the paper that provincial competition actually happens on resource based extractive industries. Now that is a phase Pakistan is just beginning to enter after the passage of the

18th Amendment to the Constitution. In fact, some have argued that the economic aspect of the turmoil in Balochistan is based on the contest on the natural resource rents that the province is bestowed with. Moreover, globalisation has enhanced the rents to be reaped from these resources and all protagonists are aware of the possibilities. So rather than the human capital based resource, it is actually the extractive based resource which is something on which present day contentions of Pakistan are happening. These contentions will further intensify if Thar coal develops to its full potential in another province. The larger picture thus is that inter-provincial competition will have to be resolved through institutionalising mechanisms for resolving federal-provincial and inter-provincial contentions. As such, 'glocalisation' and its benefits seem distant from us.

Reduction in Transaction Costs vs. Reaping Economies of Scale

The development model in this paper is in favour of sub-provincial or local government for the obvious reason that local governments reduce transaction costs so far as service delivery is concerned. At first glance, this is a truism as monitoring costs reduce at the local level and priorities for resource allocation are also best developed at that level. But as Dr Rehana Siddiqui rightly wonders what the institutional arrangements for this purpose will look like. True, the province is too large and entity and away from the people, so to speak, but the size of the districts in Pakistan are fairly large also. I happened to be travelling in Ms Hina Rabbani Khar's (Chair of this session)district, Muzzafargarh, a couple of months ago and to travel from one end of the district to the other takes more than four hours on fairly decent roads. If one travels that distance in Europe, one will cross two countries in that time. So the question I ask is what is the level of disaggregation where the 'local' begins for us? Is it the sub-district level or even further to the *deh* or *Mauza* level? Or create a level of government somewhere in between? Already we have three tiers within local government in Pakistan and we have done a lot of experimentation without reaping any spectacular developmental outcomes.

At the conceptual level, there is clearly a trade-off between is not only transaction cost reducing institutions and arrangements that allow the benefits economies of scale and scope to be reaped. There are two small points that have been made in the paper. One is a reference to state capture at the provincial level by the feudal military or industrial elite. We have seen in the last ten years that such captures are most prominent at the national or federal levels and also at the local level. Also, once capture at the local level occurs, it is very difficult to redress if there is local level 'autonomy'. At the provincial level there is a very different dynamic at play and many more stakeholders who tend to create some semblance of a balance.

One useful illustration of different tiers pitching in with their respective advantages in a developmental effort is of India's Rural Employment Guarantee Act (NREGA). NREGA has a three tier model of both financing as well as execution as well as verification across the federal government, the state government and the local government. And so far it has worked well in India, where social and institutional structures are more similar to us than elsewhere. Now are such arrangements possible in our institutional milieu? We need to explore but to take out one tier, i.e. the provincial, is neither useful nor perhaps desirable.

Province or District: Historical Trajectory of Federalism in Pakistan

Another very interesting and important point that the paper raises is that provinces in a federal set up have a holding together function. This could not be truer in Pakistan today given the 18th Amendment and the NFC Award than it ever was. In fact by going 'federal-local' during the martial law regimes, we may have had some reduction in economic transaction costs but it increased political transaction costs to the point that the country was tearing at it seems. So another question that we need to ask is how far can we divert from historical trajectories? It is easy to say that we move from one model of governance to another but in many ways we are structurally bound by our political history—which is that provinces are important middle level tiers so far as the ethnic and linguistic conception of identities are concerned.

On the whole, this is a very useful paper and I enjoyed reading it and has prompted me to ask and share a number of questions.

Asad Sayeed

Collective for Social Science Research,
Karachi.

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Honouring Prof. A. R. Khan

Reminiscing the PIDE

A. R. KHAN

I first arrived at the Pakistan Institute of Development Economics, then simply the Institute of Development Economics, at the beginning of October 1960. It was located on the top floor of the Old Sindh Assembly Building on Bunder Road in Karachi. At the time the Joint Director, the resident head of the Institute, was Irving Brecher, a Canadian economist. The Director of the Institute was Emile Despres, the ex-officio head of Ford Foundation's Pakistan Project administered from Williams College, later from Stanford University, who spent only a few weeks each year at the Institute. The Institute had a number of foreign research advisers funded by the Ford Foundation Project and a handful of Pakistani staff members, very few of them at senior levels.

For me the Institute was a refuge. Since my graduation from the Dhaka University at the end of 1959 I had been teaching in the Department of Economics. I had also been selected for graduate studies in England starting the fall of 1960 under an award of the newly-instituted Commonwealth Scholarship programme. In July 1960 I was dismissed from my teaching position at the University due to alleged undesirable political antecedents during my student days. A few weeks later my scholarship for study abroad was also withdrawn by the Government of Pakistan whose approval was a prerequisite for the finalisation of the award. The prospect of alternative employment was bleak with little private sector demand for economics graduates at the time.

I had been interviewed by Emile Despres and his colleagues who were on a recruitment mission the previous winter in Dhaka. The teaching appointment at the University, coming on the heels of the interview, had preempted a possible offer from them. A few weeks after I lost my scholarship, I received a telegram from the Institute offering me the position of a Research Officer (later named Staff Economist). This rescued me from what appeared to be virtual banishment from all possibility of a meaningful career. This was the beginning of the series of many kind acts by the Institute and its members which over time made me accustomed to treating it as a home even after my formal employment in it ended.

When Irving Brecher's term as the Joint Director ended a few months after my arrival, he was replaced by Henry Bruton. Among other foreign advisors were Gustav Ranis (who also left soon after my arrival), John Fei, Richard Porter and John Power. I was assigned to work with Richard Porter. John Fei used to deliver weekly lectures on his pet subject of 'linear graph' method of solving simultaneous systems. Syed Naseem, who had studied at the London School of Economics and was one of the few senior members

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of the staff, used to correct our homework assignments. In 1961 a formal training programme on development theory and quantitative methods was instituted as preparatory to graduate study abroad.

In 1962 the Institute selected me, along with Aminul Islam and Swadesh Bose, for graduate studies in the USA under Ford Foundation scholarship. I was admitted at a number of places of which I chose the MIT. We applied for and received US visas. Several weeks later, when I was on a farewell visit to Dhaka prior to the planned departure for the USA, news arrived that the US consulate had revoked our visas. Once again the reason was alleged political antecedents during student days. Once again I seemed to have reached the dead end as the Institute's scholarships, funded by the Ford Foundation, had until then been available only for graduate studies in the United States. By that time Henry Bruton had returned to Williams College and was replaced by Mark Leiserson from Yale. He offered to send all three of us to England for graduate studies, an offer that Bose and I eagerly grabbed. This was yet another unusual act that made me deeply grateful to the Institute. Mian Nazir Ahmad, the Secretary of the Institute, helped me cross the potentially hazardous process of obtaining a passport; the validity of my previous passport had expired.

I went to Cambridge in 1963 and returned in October 1966 after completing my PhD I received very rapid promotions before ending up in the summer of 1969 as a Research Director, the highest professional grade at the PIDE at the time. In 1968 I was appointed the first Pakistani editor of *The Pakistan Development Review*, the journal of the PIDE. In September 1970 I took leave from the PIDE to accept a position as research fellow at Nuffield College, Oxford. I have distinct recollection of the send-off reception given to me by my colleagues. My own words at the event sounded like a farewell speech. By that time the political horizon was full of signals of the impending calamity. Within months of my departure for Oxford Pakistan was engulfed in turmoil from which both the country and the Institute emerged into two separate entities. In April 1972 I returned to the Bangladesh Institute of Development Economics (a few years later given its present name the Bangladesh Institute of Development Studies) but never quite worked in it. Almost immediately I began serving in the newly-created Bangladesh Planning Commission. In September 1973 I resigned from both the Planning Commission and the Institute to take up a lectureship at the London School of Economics.

The subject of these pages is personal reminiscence of my days at the PIDE during the early years of its development. And yet it does not seem right to completely avoid a discussion of the work at the Institute. In a paper titled *PIDE's Contribution to Development Thinking: The Earlier Phase*, published on the occasion of the golden jubilee of the PIDE, I outlined the principal components of what I consider to have been an outstanding achievement for a research institution anywhere in the developing world. Starting from the scratch, with no national staff to speak of at the beginning of the 1960s, how did it succeed in achieving this height with a vibrant journal; a strong national staff producing the large majority of its research output; a forum where development thinkers from abroad collaborated with the indigenous staff in making major contributions in international development; and a producer of thought that significantly influenced development policy? I shall highlight a few factors that seem to me to have been critical. No doubt others have different and more extensive lists.

There was an entrepreneurial coalition consisting of some members of the bureaucracy and civil society; an international group of economists and advisors committed to the creation of research capability within Pakistan; and an initial donor—the Ford Foundation—willing to commit resources. The sequence of events and the relative importance of the roles of the components in the coalition differ in different narratives about how the Institute emerged.

There was an early recognition by the PIDE leadership that the necessary senior staff—its technical humanpower—will have to be created by internal investment by itself. The country did not have a pool of trained economists and demographers who might be attracted to the Institute to build up its staff. There was an acute shortage of highly trained personnel in these, as in most other, fields and the PIDE was in no position to compete with the government and others in bidding for the services of those who were there. It therefore decided to train its future senior staff. It instituted a programme of graduate studies abroad which served as an inducement for the best graduates in economics from domestic universities to join the Institute. Recognising that domestic graduates were often not adequately prepared for graduate studies at best foreign universities, it instituted a training programme focusing on basic development theory and quantitative methods. Right from the beginning the Institute's training activities provided substantial externality: the in-house training programmes were open to economists already working with the government and semi-government agencies; Ford Foundation's scholarship programme for higher studies abroad was expanded and opened up to candidates from outside the Institute which continued to administer it.

The retention rate of the staff trained abroad was high. They were required to serve the Institute for three years on their return, but the high retention rate was not due to the enforcement of this contract. Good performance was rewarded by quick promotion and a work environment that guaranteed autonomy and opportunity for exciting research. I do not think that the Institute could have prevented a member of its staff from leaving merely by enforcing the contractual obligation if the Government wanted his/her services. I myself am a case in point: two years after my return from Cambridge I was offered a high position in the Planning Commission. The Institute countered this by promoting me yet again to the position of Research Director which made me turn down the offer from the Planning Commission.

Within the Institute the 'rule of law' and the avoidance of arbitrary interference were practiced to a very high degree. Publications in the Journal were subject to anonymous peer review to which all, including the Director and the members of the international advisory board, submitted. Non-arbitrary rule of law was undoubtedly a strong factor in improving the commitment of the independent-minded researchers to the Institute.

The broader environment of incentives at the time helped the implementation of all the above. The pull of international brain drain was much weaker than now. The assault of international and national agencies bidding for the consultancy services of the skilled economists was almost non-existent. During the entire period that I was a member of the PIDE staff I never once received a consultancy assignment.

Pakistan had an authoritarian government during the entire period that I have reviewed. And yet the government tolerated independent research whose findings were at times inconsistent with the policies and objectives pursued by the government. The quid

pro quo of the implicit contract was that the Institute avoided involvement in public controversies and direct conflict with the government. The two sides understood the rules: the government accepted that a degree of autonomy and independence had to be guaranteed to enable the finest domestic centre of applied research to produce output that the country could not afford to do without while the Institute understood that the price of this autonomy was self-imposed distance from politically sensitive controversies. This is of course my personal understanding of the implicit rules of the game. Others may have different views.

By the end of the 1960s the core national staff had taken over the leadership of the Institute, producing much of its research and running most of its training programme, relegating the foreign advisors to a supporting role. It had become internationally recognised as the principal centre of applied economic research in Pakistan. The *PDR* had internationally established itself as a major journal of development.

With the passage of time many of the conditions described above changed. As a result the PIDE must also have developed coping mechanisms which enabled it to maintain its preeminent position as a centre of research and attain its new role of a university for graduate-level studies in social sciences. That is a story that must be told by those who have lived through it.

After formal severance from the Institute, my relations with both the organisations succeeding the original PIDE were gradually reestablished. My first visit to the PIDE after 1970 took place in May 1978. By that time I was working for the ILO in Geneva and the PIDE had shifted to Islamabad. The purpose of my visit to Islamabad was to participate at a Conference held at the Institute on Basic Needs, then a recently-emerged focus of development. I have vivid recollection of the visit. It was like returning to an exuberantly-welcoming home that had acquired many new members during my long absence. There was a large reception at the Islamabad Club on the day I arrived; and lunches and dinners every day at the home of or hosted by a former colleague, inevitably starting with Syed Naseem. Besides participating at the Conference, I separately gave seminars at the PIDE and at the Quaid-i-Azam University. Dr Sultan Hashmi was the Joint Director at the time, the Director, Mr. M. L. Qureshi being away. I was deeply touched by the affection shown me during the visit: several retired former colleagues, including Mian Nazir Ahmad, came to see me. I visited the PIDE again in September 1982 when Syed Naqvi was the Director and I was heading the Asian Employment Programme of the ILO. It was then that Dr Naqvi invited me to serve as a member of the Board of Editors of the *PDR*, a position that I held for decades. My most recent visit to the PIDE was in December 1997 when Sarfraz Qureshi, then Director, invited me to attend the PSDE Conference on the occasion of the 50th anniversary of Pakistan. It was a grand celebration where I met many old friends. I was again invited in 2008 by Rashid Amjad, then and now the Vice-Chancellor, to attend PIDE's golden jubilee celebrations. Although I completed and submitted the paper that I was asked to prepare, I had to cancel my visit literally on the eve of my departure due to the back injury that my wife accidentally sustained on that day. Now that the PSDE is holding a special session to remember me at its Annual Conference in 2010, I am once again unable to accept the invitation to attend due to prior travel commitments tied to important family obligations.

I am profoundly grateful to the organisers of the Conference for the extraordinary kindness in holding a special session to remember me. I know I do not deserve this honour. I view this as a reflection of what the friends at the PIDE and PSDE wanted me to achieve rather than what I have actually achieved. The gap between the two is very large, but that could never quite succeed in blocking the flow of PIDE's affection for me.

New York, December 2010

Reflection on A. R. Khan

S. M. NASEEM

Mr Chairman, Vice-Chancellor Rashid Amjad, Professor Hafeez Pasha, distinguished and more importantly, useful members of the audience.

It is a pleasure for me to participate in this Special Session to pay tribute to one of the most illustrious alumnae of IDE, the parent institute of its surviving teams, PIDE and BIDS, Dr A. R. Khan whose presence on this occasion is being surely missed. I wish PIDE had persuaded him to be here and share our feelings and to allow us to share his wisdom during half a century's scholarship in development economics. The PIDE is doing zealot service in development economics by highlighting the life and works of eminent professionals in the field especially those closely associated with it. It is hoped that it will continue to do this in a systematic way and by ensuring their presence on the occasion. I have known A. R. Khan longer than perhaps anyone in the audience largely because there are very few as old as me around. I well remember the day Aziz along with Sadesh Boss landed at lunch time in the large open corridor of the top floor of Old Sindh Assembly building Karachi whose centre was occupied by ping pong table where the Institute's staff and its foreign advisors played Table Tennis at lunch time. The Institute's real champion, John Ferry interrupted his game to welcome the two new staff members of the Institute who had just arrived from Dhaka. Aziz was one of the most productive staff economists in the Institute and produced a paper within six months on the financing of Pakistan's first Five Year Plan which he presented at a seminar on Pakistan economy in Islamabad inaugurated by President Ayub Khan. Aziz represented the PIDE along with John Ferry and myself who presented a joint paper on Planning methodology in Pakistan. All three of us travelled together from Lahore to Islamabad by car with Prof. Fay entertaining both of us with his curiosity and his American-Chinese accent. He was remarkably perceptive human being besides being a first rate economist. In the interest of public exposure I may add that Professor Fay was my mentor and has been a great deal.

My second significant encounter with Aziz was when I had returned from Yale after completing my Ph.D. and spending a year in Turkey and later joined Islamabad University, now Quaid-i-Azam University, while Aziz returned after completing his PhD from Cambridge and continued to research at IDE, Karachi. Aziz and I were both working on the development planning models and both of us did our PhD Dissertations using optimisation technique. He included one of my articles based on my thesis in the Readings on Development Planning Techniques edited by him. He also taught as a visiting faculty, part of my course in development planning at Islamabad University on the Department's invitation. 1966 to 1970 was Aziz's most productive period at IDE. The Seminal critique of Pakistan's ISI(Import Substituting Industrialisation), and not the ISI as you know, development strategy by John Power which is titled "Pakistan's

Industrialisation Strategy—A case of frustrated take-off. It was based partly on the empirical findings of a study done by Aziz which showed that that the source of increased demand for industries promoted the end of the ISI strategy and was principally an expansion of domestic consumption far in excess of normal consumption preferences and income growth. Aziz's work was also influenced by that of another Ford Foundation Advisor who became his mentor colleague at ILO and Riverside, Professor Kee Grifin. Grifin's critique of the Pakistani ISI model had a different focus than that of Power. He critiqued Pakistan's ISI strategy for deliberately redistributing income in favour of the treasury and capitalist classes in the hope of promoting higher rates of saving and investment, a strategy that also failed. Grifin's Hypothesis lent support to the grievance of East Pakistanis that resources were being exploited and deployed for the development of West Pakistan. A. R. Khan along with other prominent economists of East Pakistan notably Muhammad Anis-ur-Rahman who founded Islamabad University's Economics Department, Rahman Subhan and Nurul Islam who were his admired teachers in Dhaka University actively participated in supporting the demand for an independent Bangladesh. As a significant contribution taken out of the research at IDE Karachi was an investigation in to the behaviour of real wages in Pakistan which led him to his more abiding interest in the income distribution and poverty. This latter interest brought me in touch with Aziz once again when we both worked at ILO first in Geneva and later on in Bangkok. Aziz published a revised study on poverty in Pakistan in the collection of studies on Landlessness and Poverty in Asia. Later we worked together for a year at ARTEP in Bangkok after he searched Prof. K. N. Raj who had recruited me left for Kerala to rejoin his Institute in Tarentum and Aziz succeeded him and after Aziz, Rashid succeeded at ARTEP.

A R. Khan's career as a development economist which started modestly in Karachi took him to various positions of eminence not only in Bangladesh where he became a member of the Planning Commission but also in many academic and research institutions and agencies abroad, including Oxford, LSE, ILO, World Bank and University of California at Riverside. His contributions of research on income distribution and poverty in China are among the most highly valued in their demand. He has been a precious researcher and prolific author of articles and books on various issues in development economics. His quantitative and analytical skill have always raised his contributions and thrown new light on the subject matter. His stratospheric drive in his career as a development economist is a matter of pride for his friends, colleagues, peers and admirers.

Reflection on A. R. Khan

HAFIZ A. PASHA

Dr Naqvi, Dr Naseem, Dr Rashid Amjad,

My reflections on Aziz ur Rahman's work are not based on any personal relationship. I did not have the privilege of knowing him because he is kind of which represents even more senior generations than somebody like me these days are considered quite senior. I want to focus on his material contributions and his contributions as a development economist. His earlier work on Pakistan in the Sixties is really for students who are interested in the economic history of Pakistan, a very useful guide, particularly in terms of the experience in the process of industrialisation which has already been referred to. My own understanding of Aziz ur Rahman's work is that he was somewhat more neutral in his stance with respect to this very strong view of exploitation that had emerged from many of the East Pakistani economists at that time particularly about the trade mechanism being used for the purposes of the transfer of resources from one wing to the other wing of Pakistan. His contribution I feel can be classified broadly speaking now in terms of two or three critical areas. First, I think Aziz made a major contribution to the development of the earlier paradigm of basic needs which was really in some sense an ILO invention and in a sense also was a pre concept of a broader notion of development which subsequently became which was the human development view, of course, also propounded by South Asian economists. More recently I think his contribution has been broadly speaking in different aspects of what we now-a-days refer to as inclusive growth. A lot of his recent work, for example, particularly in China and in Bangladesh and elsewhere in Asia predominantly has focused on issue of growth and inequality, poverty, employment and of course, on implications of globalisation on what is happening to various parts of Asia. So his contributions are really extremely useful for students of development economics today who have time to look at the experience of Asian countries, particularly, major countries like China, Pakistan, Bangladesh and so on. I would suggest very strongly that there is a Bibliography of Aziz ur Rahman's work which is available here today and please have a look at it and I am sure you will find extremely useful articles for your work, particularly on the economic history of the region. So I as an economist feel that my dedication is essentially to the contributions to the knowledge base of development economics that economist of the stature of Aziz ur Rahman has given to us and we are grateful to him for that. Thank you.

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Budgetary Consequences of the 7th NFC Award

HAFIZ A. PASHA, AISHA G. PASHA, and MUHAMMAD IMRAN

1. INTRODUCTION

The 7th NFC Award of 2009 has generally been recognised as a historic achievement of the present democratically elected government. Not only was consensus achieved after a gap of 12 years among the Federal and Provincial Governments but major strides have also been made in furthering the process of fiscal decentralisation in the country. The Federal Government will be transferring substantially more resources to the provinces by a major enhancement in the collective share of the latter from the divisible pool taxes. In addition, the provinces have agreed to a horizontal sharing formula that includes multiple criteria and promises greater fiscal equalisation in favour of the more backward provinces. Straight transfers have also been rationalised and the Federal Government has agreed to pay in instalments the substantial arrears that had accumulated under different heads.

The first set of post-NFC budgets have been announced for 2010-11. Some of the consequences of the Award have become visible. The Federal Government is pushing for a strong fiscal adjustment by reducing the target for the consolidated fiscal deficit from 6.3 percent of the GDP in 2009-10 to 4 percent in 2010-11, as part of the agreement in the on-going SBA with the IMF. This is predicated, first, on a virtually zero growth in Federal current expenditure and a modest growth in development expenditure coupled with a relatively strong fiscal effort and, second, on the inability of the provinces to absorb fully the large post-NFC increase in transfers in the short run, thereby leading to a large build up in cash balances of upto one percent of the GDP.

But, a number of issues have risen already with regard to the implications of the radical change in inter-governmental relations after the 7th NFC Award. Has the underlying structural fiscal deficit been raised once-and-for-all by the Award? Can the Federal Government restrain the real growth in its expenditures given the downward rigidities in security expenditure, debt servicing, costs of civil administration and increasingly now in subsidies and transfer payments? What is the incentive for the Federal Government in a democratic dispensation to raise the tax burden and incur the political costs thereof while transferring a major part of the additional revenues to the Provincial Governments, which may be on the other side of the political divide as is the case currently in the largest province, Punjab? Given the quantum jump in transfers are the provinces likely to show financial discipline or engage in runaway spending and

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waste scarce public resources? Should incentives be put in place on top of the Award to promote greater fiscal effort and economy in current expenditure by provincial governments?

The purpose of this paper is to offer an initial answer to these questions. Using theoretical models to capture fiscal decisions by Federal and Provincial Governments, the paper aims to study historically the nature of federal and provincial responses respectively to changes in inter-governmental fiscal relations in the aftermath of various awards. Section 2 sets up a theoretical model for fiscal behaviour by the Federal Government and the corresponding model of provincial governments. Section 3 presents estimates of the behavioural equations. Section 4 quantifies the likely impact of the NFC Award on the consolidated fiscal deficit. Section 5 gives the key policy implications of the research findings. Finally, in Section 6 are presented the conclusions.

2. THE THEORETICAL FRAMEWORK

We first develop the theoretical framework for analysis of the fiscal behaviour by the Federal Government.

Federal Government

The approach generally adopted is to assume that politicians /officials maximise the utility of a typical citizen subject to a budget constraint [Slack (1980); Henderson (1968); Ghaus and Pasha (1994)]. Utility is a function of the quantity of goods and services provided by the government and on the level of consumption of private goods. Ghaus, *et al*. (1994) have demonstrated that for every rupee increase in transfers to provincial governments there is a 61 paisa increase in expenditure.

We designate the following: Y = income, R_f = tax revenue, $\overline{N}_f$ = non-tax revenue (exogeneously given), $\overline{D}_f$ = target level of deficit financing by borrowing. All variables are measured in real per capita terms.[1] If β is the proportion of tax revenues retained by the Federal Government as per the operative NFC Award, then

$$E_f = \beta R_f + \overline{N}_f + \overline{D}_f \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Where E_f = level of public expenditure in real per capita terms.

The utility function of the Federal Government is given by

$$U = (Y - R_f - \overline{N}_f - Y_{of})^{\alpha} \ (E_f - E_{of})^{1-\alpha}, 0 < \alpha < 1 \qquad \ldots \quad \ldots \quad \ldots \quad (2)$$

This is analogous to the Stone-Geary utility function.

This utility is maximised with respect to R_f and

$$\frac{\partial U}{\partial R_f} = -\frac{\alpha}{(Y - R_f - \overline{N}_f - Y_{of}} + \frac{(1-\alpha)\beta}{\beta R_f + \overline{N}_f + \overline{D}_f - E_{of}} = 0$$

[1]Price indices for public and private goods are assumed to be the same.

which yields

$$\beta R_f = (1-\alpha)\beta(Y = Y_{of}) - [\alpha + (1-\alpha)\beta]\overline{N}_f - \alpha\overline{D}_f + \alpha E_{of} \quad \ldots \quad \ldots \quad (3)$$

and

$$\frac{\partial(\beta R)}{\partial \beta} = (1-\alpha)[Y - Y_{of} - \overline{N}_f] > 0$$

Similarly,

$$\frac{\partial(\beta R)}{\partial Y} > 0 \quad \frac{\partial(\beta R)}{\partial \overline{N}} > 0$$

Therefore, the higher β is the larger the magnitude of revenues retained, β*R*, by the Federal Government.

From (3) we also have that

$$R_f = (1-\alpha)(Y - Y_o) - \left[(1-\alpha) + \frac{\alpha}{\beta}\right]\overline{N} - \frac{\alpha}{\beta}\overline{D} + \frac{\alpha}{\beta}E_o \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

and

$$\frac{\partial R_f}{\partial \beta} = \frac{\alpha}{\beta^2}[\overline{N}_f + \overline{D}_f - E_{0f}] \lessgtr 0$$

This is important finding. The impact on the level of fiscal effort of the Federal Government as measured by the level of tax revenues, *R*, of changes in β is ambiguous. If the minimum level, E_o, of public expenditure exceeds the sum of non-tax revenues, N_f, and deficit financing, $\overline{D}_f$, then a fall in β following the 7th NFC Award is likely to stimulate a positive response by the Federal Government in terms of raising the level of tax revenues.

From (1) and (3) we also obtain that

$$E_f = (1-\alpha)\beta(Y - Y_{of}) - (1-\alpha)(1-\beta)\overline{N}_f + (1-\alpha)\overline{D}_f + \alpha E_{of} \quad \ldots \quad \ldots \quad (5)$$

and

$$\frac{\partial E_f}{\partial \beta} = (1-\alpha)[Y - Y_{of} - \overline{N}_f > 0$$

Similarly,

$$\frac{\partial E_f}{\partial Y} > 0, \quad \frac{\partial E_f}{\partial \overline{N}_f} > 0$$

The target deficit can be expressed as

$$\overline{D}_f = \alpha_0 + \alpha_1 y \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

At this stage, we allow for a lagged adjustment process to the desired fiscal magnitudes. That is

$$(\beta R_f) = (1-\lambda_1)(\beta R^*_f) + \lambda_1(\beta R_{f-1}) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (7)$$

Where (βR_f^*) is given by (3). Similarly,

$$E_f = (1-\lambda_2)(E_f^*) + \lambda_2 E_{f-1}) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (8)$$

It can be seen from (7) and (8) that if ($\lambda_2 > \lambda_1 1$), due to downward rigidities in expenditure, then the deficit rises temporarily of the Federal Government following the Award.

We have finally that he equations to be estimated from the data are as follows:

$$(\beta R_f) = f_1[Y, \beta, \overline{N}_f, R_{f-1}] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (9)$$

and

$$E_f = f_2[Y, \beta, \overline{N}_f, E_{f-1}] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (10)$$

We turn now to the theoretical framework for the Provincial Governments.

Provincial Governments

In this case, we use the suffix *p* instead of *f*.

The expenditure level of the Provincial Governments is given by

$$E_p = TF + R_p + \overline{N}_p + \overline{D}_p \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (11)$$

Where *TF* is the total divisible pool transfer and

$$TF = (1 - \beta)\, R_{1f} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (12)$$

The utility function of the provincial governments is given by

$$U = (Y - R_p - \overline{N}_p - Y_{OP})^{\theta}(E_p - E_{OP})^{1-\theta}, \; 0<\theta<1 \quad \ldots \quad \ldots \quad \ldots \quad (13)$$

The utility is maximised with respect to R_p and

$$\frac{\partial U}{\partial R_p} = -\frac{\theta}{y - R_p - \overline{N}_p - y_{op}} + \frac{1-\theta}{RF + R_p + \overline{N}_p + \overline{D}_p - E_{OP}}$$

Which leads to

$$R_p = (1-\theta)(y - y_o) - \theta TF - \theta\overline{D}_p + \theta E_{OP} - \overline{N}_P \quad \ldots \quad \ldots \quad \ldots \quad (14)$$

and

$$\frac{\partial R_P}{\partial YF} = -\theta < 0$$

This implies that higher transfers lead to some slackening of fiscal effort by provincial governments.

Also,

$$E_p = (1-\theta)(y - y_o)TF + (1-\theta)D_P + \theta E_{OP} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (15)$$

and

$$\frac{\partial E_P}{\partial TF} = (1-\theta) > 0$$

As expected, higher transfers are accompanied by a rise in expenditure by provincial governments. As in the case of the Federal Government, we postulate in the case of Provincial Governments that there is a lagged process of adjustment to desired levels of own tax revenue and expenditure following the NFC Award.

3. ESTIMATED RESULTS

The respective expenditure and revenue equations for the federal and provincial governments (combined) have been estimated by the use of the OLS technique for the period, 1987-88 to 2009-10, during the tenure of which three NFC awards have been announced. All variables are measured in real per capita terms to avoid problems of non-stationarity and spurious correlations. The results obtained are described below.

Federal Government

Tax Revenues: As shown in Table 1, tax revenues (RFDPTX) of the Federal Government have a negative relationship with the share of revenues (BETA) retained from the divisible pool. Therefore, historically the federal government has tended to enhance its fiscal effort in the aftermath of awards which mandated larger transfers to the provinces. A similar response can also be expected after the 7th NFC Award, which has led to a big decline in BETA. Also, it appears that a one rupee increase in non-tax revenues leads to a decline in fiscal effort of almost 34 paisas.

Table 1

Results of Regression Analysis on Determinants of Federal Budgetary Magnitudes (All Variables Measured in Real Per Capita Terms)

	Tax Revenue	Current Expenditure	Development Expenditure
Variable[a]	(RFDPTX)	(RFCE)	(RFDE)
Constant	1187.5 (2.624)*	1002.5 (3.477)*	–751.6 (–1.796)*
Per Capita Income (RPCY)	0.085 (9.541)*	0.046 (3.475)*	0.010 (2.372)*
Share of Divisible Pool Retained (BETA)	–864.1 (–1.748)**	–	1298.0 (2.644)*
Federal Non-Tax Revenues (FNTR)	–0.335 (–2.337)*	–	–
Lagged Dependent Variable	–	0.328 (2.681)*	0.472 (5.045)*
R^2	0.969	0.921	0.864
D-W	2.230	2.464	2.366

Figures in brackets are *t*-ratios.

[a] For individual equations, one or two specific dummy variables have been used to capture outlier values. Only significant variables are included.

*Significant at 5 percent level.

**Significant at 10 percent level.

Non-tax Revenues: These are assumed to be exogeneously determined.

Current Expenditure: Current Expenditure of the Federal Government appears to be largely invariant with respect to the share, BETA, in the divisible pool. As highlighted earlier, there are strong downward rigidities with respect to expenditures on debt servicing, defence, general administration etc.

This demonstrated inability of the Federal Government to contract, following an Award which transfers more resources to the provinces, is the basic behavioural assymetry which could lead to an increase in the underlying structural fiscal deficit. The other part of this assymetry is the likely rapid expansion in provincial budgets following the receipt of larger transfers.

Development Expenditure: Development expenditure of the Federal Government does appear to be responsive to the availability of resources, as indicated by the magnitude of BETA. However, there is a process of lagged adjustment here as the coefficient of the previous years' level of development expenditure is large and significant. This implies that the federal PSDP will take some time to come down to the desired size given the fall in growth of net revenue receipts in the first year after the 7th NFC Award.

Provincial Governments

Tax Revenues: As shown in Table 2, there is a negative relationship, as hypothesised, between provincial own tax revenues and the level of transfers from the divisible pool. The provinces are inclined to slacken their fiscal effort in the event of a favourable award, like the latest dispensation. This is another factor which contributes to an increase in the consolidated fiscal deficit. However, the magnitude of the behavioural response is small. A one rupee increase in transfers leads to five paisa fall in provincial tax revenues.

Table 2

Results of Regression Analysis on Determinants of Provincial Budgetary Magnitudes (All Variables in Real Per Capita Terms)

	Tax Revenues	Current Expenditure	Development Expenditure
Variable[a]	(RPTR)	(RPCE)	(RFDE)
Constant	21.5 (1.006)	–87.6 (–0.687)	–200.1 (–1.621)
Per Capita Income (RPCY)	0.006 (4.341)*	0.027 (3.139)*	0.010 (1.994)**
Transfers from Divisible Pool (RDPTRF)	–0.049 (–2.101)	0.402 (2.513)*	–
Revenue Surplus (RDPTRF–RPCE+RPTR+RPNTR)	–	–	0.376 (2.695)*
Lagged Dependent Variable	–	–	0.566 (5.818)*
R^2	0.585	0.906	0.954
D-W	1.478	2.674	1.771

Figures in brackets are *t*-ratios.

*Significant at 5 percent level.

**Significant at 10 percent level.

Non-tax Revenues: These are assumed to be exogeneously determined.

Current Expenditure: Current expenditure of Provincial Governments appears to respond quickly and strongly to larger transfers. The absence of a significant lagged variable indicates that the process of adjustment is more less, instantaneous. A one rupee increase in transfers leads to a more than 40 paisa rise in current expenditure.

Development Expenditure: The combined ADP of the Provincial Governments also appears to be linked to the size of the revenue surplus, which is likely to be larger when transfers increase. However, there is a process of lagged adjustment here indicating that, especially in the case of the smaller Provincial Governments, there are limits to absorption capacity, in terms of implementation of a larger portfolio of projects.

Results of the empirical analysis of past fiscal behaviour indicate that in the aftermath of an Award which expands the share of provinces, the consolidated fiscal deficit tends to rise because there are no corresponding cutbacks in federal current expenditure, the fall in the size of the PSDP is accomplished with some time lag, while provincial current expenditure rises rapidly in response to larger transfers. This impact is somewhat moderated by the launching of a more intensive fiscal effort through tax reforms by the Federal Government to at least partially make up for the loss in net revenue receipts. Also, provincial ADPs take some time to fully adjust upwards.

Given these contrasting behavioural responses, the net impact on the overall fiscal deficit of an Award like the 7th NFC Award is ambiguous. Based on the estimated equations, we project next the relevant budgetary magnitudes for the federal and provincial governments in the presence and in the absence of the 7th NFC Award. This will enable derivation of the impact on the combined fiscal deficit and on the deficit of the respective governments.

4. BUDGETARY PROJECTIONS

Table 3 presents the budgetary projections for 2010-11 with and without the 7th NFC Award. These projections are compared with the estimates announced in the Budget of 2010-11 by the Federal and the Provincial Governments.

A number of important conclusions emerge from the table. First, given the targets embodied in the on-going SBA with the IMF, the budget documents are very optimistic in projecting that the consolidated fiscal deficit will be reduced sharply to 4 percent of the GDP from 6.3 percent in 2009-10. This implies that either the NFC Award is conducive to deficit reduction or that the scaling down of the deficit will be achieved despite the award.

The first area of optimism is with regard to the growth of federal tax revenues, which are expected to rise by 26.7 percent, substantially in excess of the nominal growth in GDP of 14.4 percent expected at the time of the framing of the budget. The equation for federal tax revenues estimated in Table 1 indicates a more moderate growth of 17.6 percent, which includes an incremental fiscal effort of Rs 35 billion on top of the revenue expectation in the absence of the 7th NCF Award.

Table 3

*Projection of Consolidated Budget**

(Rs in Billion)

	2009-10 (Revised)	2010-11 (Budget)	Projections, 2010-11 Without 7th NFC Award	Projections, 2010-11 With 7th NFC Award
(a) Revenue	**2079**	**2607**	**2437.1**	**2463.4**
Tax Revenues	**1500**	**1907**	**1737.1**	**1763.4**
Federal[a]	1445	1831	1665.0	1700.1
Provincial	55	76	72.1	63.3
Non-tax Revenues	**579**	**700**	**700.0**	**700.0**
Federal	495	634	634.0	634.0
Provincial	84	66	66.0	66.0
(b) Expenditure	**3040**	**3293**	**3274.1**	**3348.7**
Current Expenditure	**2482**	**2696**	**2644.9**	**2736.2**
Federal	1855	1866	1897.1	1897.1
Provincial	627	830	747.8	839.1
Development Expenditure	**558**	**597**	**629.2**	**612.6**
Federal	299	257	345.3	292.6
Provincial	259	340	283.9	319.9
(c) Budget Deficit	**–961**	**–686**	**–837**	**–885**
% of GDP	**–6.3**	**–4.0**	**–4.9**	**–5.2**

*Without allowing for the impact of the floods.

[a] Including non-FBR revenues of Rs 142 billion in 2010-11.

Turning to federal current expenditure, the budget expects to contain the growth in 2010-11 to only 0.6 percent. This is to be achieved despite the higher costs of implementing the salary award of a 50 percent hike in basic pay and increase in other allowances. The estimated equation indicates somewhat more growth.

The federal budget also anticipates a fall in development spending in the PSDP of over 14 percent. However, the estimated equation for federal development expenditure reveals that the likelihood is for only a small fall in the first year after the NFC Award. Nevertheless, this is over Rs 52 billion less than the level projected in the absence of the Award.

Provincial governments have also made optimistic projections about the growth rate of their tax revenues in 2010-11 at over 38 percent. The historical evidence, as highlighted earlier, is for these governments to slacken their fiscal effort following the receipt of larger transfers. As such, the equation for provincial tax revenues indicates a more modest growth of 15 percent, with the level about Rs 9 billion less than what could have been achieved in the absence of the NFC award.

As far as provincial current expenditure is concerned, budget estimates and estimates from the relevant equation are close to each other. It is important to note that larger NFC transfers will stimulate current expenditure of provincial governments by as much as Rs 91 billion, a large part of which will go towards financing the salary hike.

Development expenditures have been shown as rising rapidly by over 31 percent in the provincial budgets. But, as indicated above, the smaller provincial governments like Balochistan, may not be able to raise the capacity to execute a much larger development program in the short run. As such, the shortfall could be about Rs 20 billion in relation the budget estimates. However, this will still be Rs 36 billion higher than the level that would have been attained in the absence of the NFC Award. Overall, the equations used for forecasting federal and provincial revenues and expenditure indicate that the likely level of the consolidated fiscal deficit in 2010-11 is 5.2 percent of the GDP in relation to the original budgeted level of 4 percent of the GDP. We also have the conclusion that in the first year after the NFC Award the consolidated budget deficit is likely to be Rs 48 billion higher, equivalent to 0.3 percent of the GDP, than would have been the case in the absence of the NFC Award.

In terms of the extent of fiscal decentralisation, the 7th NFC Award is expected to increase the combined share of the provincial governments in public expenditure from 29 percent in 2009-10 to 35 percent in 2010-11. This is a big jump and Pakistan will approach an intermediate level of fiscal decentralisation. In particular, provincial governments will now account for the major share of development expenditure.

Table 4 indicates that the increase in the federal deficit is even larger at about 0.6 percent of the GDP following the NFC Award. This is partly compensated for by a decline in the combined fiscal deficit of provincial governments of 0.3 percent of the GDP.

Overall, we have the conclusion that the 7th NFC Award has led to some deterioration in the underlying structural fiscal deficit of the Federal and Provincial Governments combined, albeit by a relatively small magnitude of about 0.3 percent of the GDP. However, this impact could increase as the smaller provincial governments, like that of Balochistan, gear up to execute larger development programmes.

Table 4

Summary of the Deficit of the Federal and Provincial Governments

(% of GDP)

			Projections, 2010-11	
	2009-10 (Revised)	2010-11 (Budget)	Without 7th NFC Award	With 7th NFC Award
Federal	–5.7	–4.0	–4.4	–5.0
Provincial	–0.6	0.0	–0.5	–0.2
Combined	**–6.3**	**–4.0**	**–4.9**	**–5.2**

5. POLICY IMPLICATIONS

The basic factors contributing to the rise in the fiscal deficit are the decline in the fiscal effort of Provincial Governments and a big increase in expenditure in the anticipation of larger transfers mandated by the NFC Award. One way in which this tendency can be mitigated is to provide an incentive to provincial governments as part of the Award in the form of a matching grant equal to the increase in self-financing of

expenditure in relation to some minimum benchmark level, which will, of course, depend on the fiscal capacity of a particular provincial government, as follows:

$$G = [R_p + \overline{N}_p - \overline{E}_p = B_0] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (16)$$

If and only if $G > 0$

Where G = additional grant, B_0= benchmark level.

In this case

$$E_p = \frac{\overline{TF}}{2} R_p + N_p + \overline{D}_p - \frac{B_0}{2} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (17)$$

Based on the process of utility maximisation of the type described earlier, we obtain

$$R_p = (1-\theta)(y - y_{op}) - \left(\frac{\theta}{2}\right)\overline{TF} - \overline{N_p} - \overline{D}_p / 2 - B/2 \quad \ldots \quad \ldots \quad \ldots \quad (18)$$

A comparison with (16) reveals that in the presence of this incentive scheme the extent of reduction in fiscal effort is halved given the size of transfers, *TF*.

Similarly, we have

$$E_p = (1-\theta)(y - y_o) + \left(\frac{1-\theta}{2}\right) TF + \frac{(1-\theta)\overline{D_p}}{2} - \frac{(1-\theta)B}{2} \quad \ldots \quad \ldots \quad (19)$$

The new expenditure equation when compared with (16) shows that the increase in expenditure associated with an increase in transfers is half of what it is likely to be in the absence of the incentive.

Therefore, a matching grant linked to increase in self-financing will reduce the negative effects of the increase in transfers following an Award. It is recommended that such a scheme be put in place as part of the NFC Award, if not in the present award then in the next Award.

The 11th Finance Commission of India has incorporated the above type of incentive with a view to providing for better financial management and greater fiscal discipline. As such, 7.5 percent of the revenues to the states is to be shared on the basis of the measure of financial discipline corresponding to the ratio of own revenue receipts to total revenue expenditure.

6. CONCLUSIONS

The paper has analysed the impact of the 7th NFC Award on the size of the consolidated fiscal deficit of the Federal and Provincial Governments in 2010-11, the first year of implementation of the Award. A behavioural asymmetry is observed whereby federal current expenditure is inflexible downwards in the face of a decline in resources while provincial current expenditures show a big and rapid response to larger transfers. This asymmetry is the basic cause of any increase in the fiscal deficit although this is partially mitigated by enhanced fiscal effort by the federal governments and some lag in the rise in development spending by the provinces. Overall, it is estimated that the

consolidated fiscal deficit is higher by about 0.3 percent of the GDP due to the behavioural responses associated with the Award. The paper proposes an incentive scheme to reduce the negative effects arising from an Award which increases the share of the provinces.

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Financial Implications of the 7th NFC Award and the Impact on Social Services

MUHAMMAD SABIR

1. INTRODUCTION

The financial status of provincial governments in Pakistan hinges largely on federal transfers to the provinces constituted through National Finance Commission (NFC) Awards. These awards design the formula of distribution of resources between federal and provincial governments, and among the provinces for five years. Historically, federal and all provincial governments have tried their level best to get a higher share of the revenues in order to stabilise their own financial status. As a result, there are very few examples of consensus based conclusive awards in the past. These consensus based awards have had different gainers. For instance, in the NFC Award 1991, provincial governments were the main beneficiaries as they received substantially higher shares of buoyant taxes such as sales and income taxes. In contrast, the largest beneficiary of the NFC Award 1997 was the federal government as it allocated higher shares of all taxes to itself in order to stabilise its financial status. Given the sensitivity attached to NFC awards, where an increase or decrease in the share of any tier of the government affects the share of other tiers with the same magnitude in the opposite direction, it seems very difficult to develop a consensus among federal and provincial governments. As a result, since the separation of East Pakistan, there have been only three conclusive NFC Awards (1974, 1991, 1997) and one presidential distribution order (2006) prior to the 7th NFC Award.

In this context, one of the major developments in 2009-10 was a successfully concluded seventh NFC Award or NFC Award 2009, which affected the resource distribution formula. Given the past experience of several inconclusive NFC Awards, a consensus based NFC Award is in itself a big achievement. It is the first time after the secession of East Pakistan that the distribution of resources among provinces has been based not only on population but also on other factors such as backwardness, inverse population density and revenue collection/generation. The NFC Award 2009 has also helped to resolve other issues such as Gas Development Surcharge (GDS) and Hydroelectricity Profit.

This paper aims to analyse the financial implications of the NFC Award 2009 and its impact on three major social services namely education, health, and water supply and

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sanitation. This analysis would not only add to relevant research in Pakistan but would also help in identifying policy implications for future NFC Awards.

2. AN OVERVIEW OF THE NFC AWARDS

The history of intergovernmental fiscal transfers from the federal government to the provincial governments in the sub-continent dates back to 1919. Since the independence of Pakistan in 1947, these transfers have experienced many changes in line with constitutional developments. However, as in other countries, the purpose of fiscal transfer system in Pakistan is primarily to correct the vertical fiscal imbalances between the federal and the provincial governments and horizontal imbalances between provinces.

According to the constitution of Pakistan, the NFC is set up by the president of Pakistan every five years. This commission allocates or awards the total resources or revenues collected during a fiscal year between the federal government and provincial governments, hence such a decision is called the NFC Award. The NFC Award decides the method for allocating the resource transfers for five years based on a formula for revenue sharing. Table 1 gives the chronology of NFC Awards in Pakistan. It shows that since the separation of East Pakistan, there have been only three conclusive NFC Awards (1974, 1991, 1996) in addition to a Distributional Order 2006—only three NFC Awards during a period of 32 years (1974 to 2006). After the NFC Award 1974, two attempts were made for the revision in the design of intergovernmental transfers but these were unsuccessful. The much awaited NFC Award was then materialised in 1990-91. This was followed by the NFC Award 1996 constituted for a period of five years (1996-97 to 2001-02), but remained in practice till 2005-06. In 2006, a distribution order from the president of Pakistan replaced the NFC Award 1997.

Table 1

Chronology of NFC Awards

S. No.	Name	Status
First	**NFC Award 1974**	**Conclusive**
Second	NFC Award 1979	Inconclusive
Third	NFC Award 1985	Inconclusive
Fourth	**NFC Award 1991**	**Conclusive**
Fifth	NFC Award 1995	Inconclusive
	NFC Award 1997	**Conclusive**
Sixth	NFC Award 2002	Inconclusive
	Distribution Order 2006	–
Seventh	**NFC Award 2009**	**Conclusive**

On the distribution method, all the commissions up to the fourth NFC (1991) followed the "gap-filling" approach. This approach assesses the revenue receipts and expenditure based on the actual numbers and recommends non-plan deficit grants to fill the financing gaps. This approach encouraged the provincial governments to understate the predicted growth of their own tax revenues, to increase their commitments on non-plan expenditure, and to run deficit budgets in the expectation that their financing gaps would be filled by grants from the Finance Commission. Apart from encouraging

inefficiency, this approach also resulted in qualifying relatively better off provinces for such grants while disqualifying some of the poor provinces.

The fifth Finance Commission adopted a new formula for the allocation of federal transfers. This differed from the previous one on two grounds: (1) it was based on the new idea of National Resource Picture; and (2) it included all federal taxes in the divisible pool with revised shares. In addition, it provided constitutional subvention for relatively two backward provinces Khyber Pakhtunkhwa (KPK) and Balochistan. Subsequent NFCs were constituted in 2000 and 2005 but an award could not be agreed upon. Finally, in the absence of any recommendation from the sixth Finance Commission, the "Distribution of Revenues and Grants-in-Aid (Amendment) Order (DRGO) 2006" was passed by the president of Pakistan. The DRGO 2006 differs with other NFC Awards in three ways. First, it introduced a variable share of provincial governments (ranges from 41.50 percent in 2006-07 to 46.25 percent in 2010-11). Second, it introduced two divisible pools: one is the largest divisible pool which relied on population as a sole criterion for horizontal distribution and other was used for distribution of 1/6th of the sales tax on new shares of 50, 34.85, 9.93 and 5.22 for Punjab, Sindh, KPK and Balochistan respectively. Third, it separately awarded grants-in-aid to all provinces based on an unknown criterion.

2.1. Key Elements of NFC Award 2009

The NFC Award 2009 has brought some profound changes in the resource distribution formula. It is for the first time since 1973 that the distribution of resources among provinces is based not only on population but also on other criteria such as backwardness, inverse population density and revenue collection/generation. This Award has also helped in resolving other issues such as GDS and Hydroelectricity Profit. The financial implications of this Award for the federal and provincial governments are vast and long-lasting with a substantial increase in transfers from the federal government to provinces due to the following five reasons.

(1) The collection charges of the federal government have been decreased from 5 percent to 1 percent, thereby enlarging the overall size of the divisible pool.
(2) The federal government and all the four provincial governments recognised the role of KPK as a frontline province against the war on terror. One percent of net proceedings of the divisible pool are therefore earmarked for KPK during the entire award period. For instance, in 2010-11, KPK will receive an additional amount of Rs 15 billion against the additional costs it is bearing due to the war on terror.
(3) The remaining proceeds of the provincial share of the divisible pool have been increased from 46.25 percent to 56 percent in 2010-11 and then to 57.5 percent for the rest of the award period. This means that the share of the federal government in the net divisible pool would be 44 percent in 2010-11 and 42.5 percent during the rest of the award period.
(4) This award ensures that Balochistan will get at least Rs 83 billion under divisible pool transfers. In case the estimated share of Balochistan is less than Rs 83 billion, the balance funds would be contributed by federal government.

(5) GST on services collected in the Central Excise (CE) mode is also transferred to the provincial governments under the straight transfer mode—implying that revenues collected from a province would be transferred to that province on the basis of collection. The budget 2010-11, however, did not adhere to this principle.

In addition, the NFC Award 2009 also allows Gas Development Surcharge (GDS) arrears to be paid retroactively to Balochistan on the basis of the new formula and for the payment of the long held up hydel profits to KPK.

2.2. Vertical Distribution of Divisible Pool

Table 2 presents the formula for vertical distribution or the provincial share in the divisible pool of NFC awards. It indicates that until the NFC Award 1991, provincial governments had been receiving 80 percent of two major federal taxes "Sales Tax" and "Income and Corporation Tax", which were the most buoyant sources of revenues and the focus of tax and tariff reforms initiated in the early 1990s. Another important point is that the share of provinces was further increased by including in it the federal excise duty on tobacco and sugar.

Table 2

Provincial Share in Divisible Pool Taxes

(%)

Divisible Pool Taxes	NFC 1974	NFC 1991	NFC 1997	DRGO 2006	NFC 2010
Income Tax and Corporation Tax*	80	80	37.5	41.50 – 46.25	56.0 – 57.5
– Other Direct Taxes	–	–	37.5	41.50 – 46.25	56.0 – 57.5
Sales Tax	80	80	37.5	41.50 – 46.25	56.0 – 57.5
Central Excise Duty**	–				
– Tobacco	–	80	37.5	41.50 – 46.25	56.0 – 57.5
– Sugar	–	80			
Import Duties	–	–	37.5	41.50 – 46.25	56.0 – 57.5
Export Duties					
– Cotton	80	80	–	–	–

*Excluding taxes on income consisting of remuneration paid out of federal consolidated fund.

**Excluding Central Excise Duty on Natural Gas.

In contrast, the NFC Award 1997 included all federal taxes in the divisible pool and decreased the provincial share from 80 percent to 37.5 percent, which was less than half of their previous share. This change was based on optimistic revenue targets of certain macroeconomic projections such as 17 percent growth in nominal GDP, 11 percent domestic and external inflation rate and higher expectations of revenue collection from tax and tariff reforms. However, these expectations did not materialise due to many external and internal shocks that largely affected the federal tax collection.

2.3. Horizontal Distribution of the Divisible Pool

Table 3 shows the formula for horizontal distribution of the divisible pool in NFC Awards. It points out that the entire distribution of divisible pool among provinces in the first three conclusive NFC Awards and in DRGO was based only on population. However, the NFC Award 2009 framed the distribution of the divisible pool based on four weighted factors. These include: population (82 percent), poverty and backwardness (10.3 percent), revenue collection/generation (5 percent) and inverse population density (2.7 percent).

Table 3

Factors Used in Horizontal Distribution of Divisible Pool Taxes

(%)

Factors	NFC 1974	NFC 1991	NFC 1997	DRGO 2006*	NFC 2010
Population	100.0	100.0	100.0	100.0	82.0
Poverty/Backwardness	–	–	–	–	10.3
Revenue Collection/Generation	–	–	–	–	5.0
Inverse Population Density	–	–	–	–	2.7

*Other than 1/6th of sales tax collected and distributed in lieu of Octroi/Zila Tax.

3. FINANCIAL IMPLICATIONS OF THE NFC AWARD 2009

Table 4 presents the vertical distribution of FBR tax estimates in Budget 2010-11 as per the NFC Award 2009. The FBR tax revenue target for 2010-11 is Rs 1,647 billion. The federal government will receive money from these taxes under two heads: (1) divisible pool share, and (2) others, largely based on collection charges and export duties. According to this, the total share of the federal government in FBR taxes in 2010-11 would be Rs 683 billion. Similarly, four provincial governments altogether receive revenues under two heads: (1) divisible pool transfers, and (2) others, an aggregate of revenue transfer under war on terror, provincial GST, excise duty on natural gas and grant for Balochistan to meet the minimum requirement of Rs 83 billion. As a result, the total share of the four provincial governments would be Rs 964 billion if the FBR achieved its tax collection targets.

Table 5 presents the horizontal distribution of FBR taxes estimates in Budget 2010-11 as per the NFC Award 2009. Of the total Rs 844 billion in divisible pool, Punjab would accrue Rs 437 billion (51.7 percent), Sindh Rs 207 billion (24.6 percent), KPK Rs 123 billion (14.6 percent) and Balochistan Rs 77 billion (9.1 percent). Of the total 118 billion transfers in the "others" category, KPK would receive Rs 15.2 billion under the head of war on terror. In order to meet the requirement of a minimum transfer of Rs 83 billion for Balochistan, the federal government would give an additional Rs 6.3 billion to Balochistan. Table 5 also shows the excise duty on natural gas separately because this is a provincial tax and the federal government transfers this tax separately to provinces after deducting collection charges.

Table 4

Vertical Distribution of FBR Taxes as per the 7th NFC Award

(Rs Million)

		Federal Revenues			Provincial Revenues		
	Budget Estimates 2010-11	Divisible Pool	Others	Total	Divisible Pool	Others	Total
Income Tax	633,000	270,220	10,113	280,333	343,916	8,751	352,667
Capital Value Tax	4,700	2,027	28	2,055	2,580	66	2,645
Customs	180,800	76,231	5,079	81,310	97,021	2,469	99,490
Sales Tax	674,900	251,802	3,465	255,267	320,475	99,157	419,633
Federal Excise	153,600	63,095	868	63,964	80,303	9,333	89,636
Total	1,647,000	663,375	19,553	682,929	844,296	119,776	964,071

Source: Author's estimates based on Budget Estimates of 2010-11, Explanatory Memorandum on Federal Receipts 2010-11.

Table 5

*Horizontal Distribution of FBR Taxes as per the 7th NFC Award**

(Rs Millions)

	Punjab	Sindh	KPK	Balochistan	Total
Divisible Pool Taxes					
Taxes on Income	177,942	84,431	50,281	31,262	343,916
Capital Value Tax	1,335	633	377	234	2,580
Sales Tax (Goods)	50,199	23,819	14,185	8,819	97,021
Federal Excise (Net of Gas)	165,814	78,677	46,853	29,131	320,475
Customs Duties	41,549	19,714	11,740	7,300	80,303
Total: Divisible Taxes (A)	436,839	207,275	123,436	76,746	844,296
Others					
War on Terror/Other Transfers	–	–	15,229	6,254	21,483
Excise Duty on Natural Gas	407	5,025	209	1,503	7,144
G.S.T (Provincial)	51,155	21,145	12,325	4,557	89,183
Total: Other Transfers (B)	51,563	26,170	27,763	12,314	117,810
Total Transfers (A+B)	488,401	233,445	151,199	89,060	962,106

Source: Author's estimates based on Budget Estimates of 2010-11, Explanatory Memorandum on Federal Receipts 2010-11.

An interesting implication of the NFC Award 2009 is the acceptance of provincial rights over GST services. As per the constitution, GST services is a provincial tax, however, FBR collects it under two heads: (1) GST services (CE Mode) and (2) GST services (provincial). While GST services (provincial) is directly transferred to provincial governments after deducting collection charges, GST services (CE Mode) is treated as GST on goods which is distributed among the federal and provincial governments similar to other divisible pool taxes. The NFC Award 2009 treats both GST services (CE Mode) and GST services (provincial) as GST services (provincial) and transfers the amount collected under this tax to provincial governments after deducting collection charges. Thus while the anomaly in vertical distribution of GST services has been resolved in the NFC Award 2009, the horizontal distribution of this tax is still an unsettled impediment. The distribution of GST services shown in Table 5 is as reported in federal budget documents, which is based on population share of provinces. The distribution of GST on services on the basis of population, though beneficial for Punjab and KPK, is not in line with the spirit of the NFC constitution. Nevertheless, the disagreement over the distribution of GST on services is reflected in the revised federal budget documents as it is stated "The indicative share of GST on services (provincial) are strictly provisional at this stage since a decision on levying a reformed GST has been deferred to 1st October, 2010. These shares would be revised in the light of a decision taken after discussion with the provinces. The final share so determined would take effect from 1st July, 2010."

3.1. Comparison of NFC Award 2009 with DRGO 2006

Table 6 shows the comparison of NFC Award 2009 with DRGO 2006. It indicates that the federal government would receive almost Rs920 billion revenues in 2010-11 if the DRGO 2006 would continue. However, due to revision in resources distribution formula in 2010, the federal government would get revenues amounting to Rs 685 billion. As a result of the NFC Award 2009, the federal revenues would decline by Rs 235 billion in 2010-11 compared to revenues under DRGO 2006.

Table 6

Comparative Impact on Federal Revenues NFC Award 2009 and DRGO 2006

(Rs Million)

	NFC Award 2009	DRGO 2006	Difference
Income Tax	280,333	357,803	–77,470
Capital Value Tax	2,055	2,635	–580
Customs	81,310	103,132	–21,822
Sales Tax	257,087	374,142	–117,054
Federal Excise	64,109	82,171	–18,061
Total	684,894	919,882	–234,988

Source: Author's estimates based on Budget Estimates of 2010-11, Explanatory Memorandum on Federal Receipts 2010-11.

Table 7 shows province-wise financial implications of the NFC Awards 2010 in comparison with DRGO 2006. It indicates that in absolute terms, Punjab is the biggest beneficiary of the NFC Award 2009, as it is likely to receive Rs 83 billion additional revenues in 2010-11 as per NFC 2010 compared to DRGO 2006. This is on two counts: one, Punjab's share of higher than 50 percent in the divisible pool allows it to benefit the most from the huge increase in vertical transfers; two, the distribution of GST on services on the basis of population rather than on collection adds to this increase.

In percentage terms, however, Balochistan is the major beneficiary, with an increase of more than 100 percent, followed by KPK. The relative picture shows that in percentage terms, the NFC Award 2009 is more beneficial for relatively backward provinces. Gain from NFC Award 2009 to Sindh may increase if GST services (provincial) is not distributed on the basis of population.

Table 7

Comparative Impact on Provincial Revenues NFC Award 2009 and DRGO 2006

(Rs Million)

	NFC Award 2009	DRGO 2006	Difference
Punjab	488,401	405,607	82,794
Sindh	233,445	187,502	45,943
Khyber Pakhtunkhwa	151,199	95,599	55,600
Balochistan	89,060	38,410	50,650
Total	962,106	727,118	234,988

Source: Author's estimates based on Budget Estimates of 2010-11, Explanatory Memorandum on Federal Receipts.

3.2. Comparison of the NFC Award 2009 with the NFC Award 1997

Table 8 presents a comparison of federal revenues under the NFC Award 2009 with the NFC Award 1997. It indicates that the federal government would receive almost Rs1055 billion in 2010-11 if the 1997 NFC Award would continue. However, due to revision in resource distribution formula in 2010 the federal government would get Rs685 billion. As a result of the NFC Award 2009 federal revenues would decline by Rs370 billion in 2010-11 compared to revenues under NFC Award 1997.

Table 8

Comparative Impact on Federal Revenues NFC Award 2009 and NFC Award 1997

(Rs Million)

	NFC Award 2009	NFC Award 1997	Difference
Income Tax	280,333	409,868	–129,535
Capital Value Tax	2,055	3,026	–971
Customs	81,310	117,826	–36,516
Sales Tax	257,087	429,616	–172,529
Federal Excise	64,109	94,333	–30,223
Total	684,894	1,054,668	–369,773

Source: Author's estimates based on Budget Estimates of 2010-11 published in Explanatory Memorandum on Federal Receipts.

Table 9 highlights the province-wise financial implications of the NFC Awards 2010 in comparison with the NFC Award 1997. The province-wise federal transfers show that in absolute terms, Punjab is likely to receive Rs152 billion additional revenues in 2010-11 as per the NFC Award 2009 compared to the 1997 NFC Award. The comparative picture of other provinces show that Sindh, KPK and Balochistan are likely to receive Rs 90 billion, Rs 70 billion and Rs 57 billion additional revenues in 2010-11 as per the NFC 2010 compared to the NFC Award 1997.

Table 9

Comparative Impact on Provincial Revenues NFC Award 2009 and NFC Award 1997

(Rs Million)

	NFC Award 2009	NFC Award 1997	Difference
Punjab	488,401	336,071	152,330
Sindh	233,445	143,773	89,672
Khyber Pakhtunkhwa	151,199	81,082	70,117
Balochistan	89,060	31,406	57,654
Total	962,106	592,332	369,773

Source: Author's estimates based on Budget Estimates of 2010-11, Explanatory Memorandum on Federal Receipts.

3.3. Comparison of NFC Award 2009 with NFC Award 1991

Table 10 displays a comparison of federal revenues under the NFC Award 2009 with the NFC Award 1991. While the previous two comparisons show that the NFC Award 2009 caused a declined in federal revenues, comparison with NFC Award 1991gives an opposite picture. It indicates that federal government would receive almost Rs 607 billion in 2010-11 if the 1991 NFC Award would continue. However, due to revision in resources distribution formula in 2010 it would get Rs 685 billion. Thus, as a result of the NFC Award 2009, the federal government is likely to receive an addition of Rs 78 billion in comparison with the NFC Award 1991. It is important to note that while revenues from customs, capital value tax and part of federal excise are not shared with provincial governments, the high share of provinces in two buoyant sources of revenues income and sales tax causes a substantial reduction in federal revenues.

Table 10

Comparative Impact on Federal Revenues NFC Award 2009 and NFC Award 1991

(Rs Million)

	NFC Award 2009	NFC Award 1991	Difference
Income Tax	280,333	156,984	123,349
Capital Value Tax	2,055	4,700	-2,645
Customs	81,310	180,800	-99,490
Sales Tax	257,087	160,168	96,920
Federal Excise	64,109	104,050	-39,941
Total	684,894	606,702	78,193

Source: Author's estimates based on Budget Estimates of 2010-11, Explanatory Memorandum on Federal Receipts 2010-11.

Table 11 brings to light a very important aspect of the NFC Award 2009 in comparison with the NFC Award 1991. It indicates that while there is a decline in vertical share of provinces under the NFC Award 2009 compared to the 1991 NFC Award, this decline is not evenly distributed among the provinces. For instance, if the NFC Award 1991 had continued, Punjab and Sindh would have been likely to receive an additional amount of Rs 105 billion and Rs 17 billion respectively compared to the NFC Award 2009. In contrast, KPK and Balochistan would have been likely to receive Rs 8 billion and Rs 35 billion less in 2010-11 respectively compared to transfers as per the NFC Award 2009. This indicates that the NFC Award 2009 benefits the two relatively more backward provinces, KPK and Balochistan.

Table 11

Comparative Impact on Provincial Revenues NFC Award 2009 and NFC Award 1991

(Rs Million)

	NFC Award 2009	NFC Award 1991	Difference
Punjab	488,401	593,025	–104,623
Sindh	233,445	249,986	–16,541
Khyber Pakhtunkhwa	151,199	142,991	8,208
Balochistan	89,060	54,297	34,763
Total	962,106	1,040,298	–78,193

Source: Author's estimates based on Budget Estimates of 2010-1, Explanatory Memorandum on Federal Receipts 2010-11.

4. IMPACT ON SOCIAL SERVICES

Public expenditure on social services such as education and health is generally considered as a source of poverty reduction as it contributes to human capital formation. Moreover, public spending on social services would likely cause a positive impact on achieving the Millennium Development Goals. However, Pakistan falls among the countries that spend a very low share of their GDP on the social sector.

Table 12 shows a comparison of Pakistan with other East and South Asian countries. It is interesting to note that public spending on education in Bangladesh is higher than the public spending on three social services in Pakistan namely education, health, and water supply and sanitation. Even public spending on education in India is more than double what it is in Pakistan. Similarly, governments in Thailand, Malaysia, Iran and Vietnam spend a much higher share of their GDP on education as compared to Pakistan. Several plans have been made to increase the share on public spending on social services in Pakistan. At policy planning level almost all policy documents including five year plans, MTDF, MTBF, PRSPs gave greater importance to social sector spending. Similarly, the 1997 NFC Award and the Fiscal Responsibility and Debt Limitation Act, 2005 included social sector spending in the list of priority expenditures. However social sector spending has remained very low, particularly after the 1997 NFC award. The allocation of higher share of taxes to provinces under the seventh NFC Award provides a hope that these expenditures as a percentage of GDP may rise during the current five year period.

Table 12

Public Sector Spending on Education: A Comparison with Selected Asian Countries

(As Percentage of GDP)

Country	Public Sector Spending
Vietnam	5.3
Iran	5.2
Malaysia	4.7
Thailand	4.5
Indonesia	3.5
India	3.3
Nepal	3.2
Bangladesh	2.6
Pakistan	
Education	1.5
Health	0.7
Water Supply and Sanitation	0.2
Total	2.4

Source: Pakistan Economic Survey 2009-10 for other countries and Authors estimate for Pakistan.

In this context, this section analyses the estimated impact of financial implications of the NFC Award 2009 in comparison with the DRGO 2006, the NFC Award 1997 and the NFC Award 1991 on provincial social services. The analysis is based on a hypothesis that a change in design of federal transfers in favour of provincial government would be

likely to cause an increase in social sector expenditures. This may occur because provincial governments are primarily responsible for the financing and delivery of social services and any increase in their resources may allow them to allocate and spend more money on social services.

4.1. Empirical Strategy

A search of publically available research did not indicate sufficient empirical studies that tested the response of change in intergovernmental transfers on social services expenditures. There is a substantial descriptive literature addressing many aspects of intergovernmental transfers with respect to fiscal competition among the sub-national governments [Musgrave (1997)], market incentives of federalism [Qian and Weingast (1997)], intergovernmental transfers and deadweight losses in tax system [Smart (1996)], coordination failure [De Mello Jr. (2000)], survey of approaches in designing intergovernmental fiscal transfers [Bird and Smart (2002)], principles and practices of intergovernmental transfer [Boadway and Shah (2007)] and finally social policy and state revenues [Hinojosa, Bebbington, Barrientos, and Addison (2010)]. However, this body of work really did not shed much light on the normative question of consequences of any change in the designed mechanism of intergovernmental transfers on provincial expenditures.

In Pakistan Ghaus and Pasha (1996) and Sabir (2001) developed and tested an econometric model for Pakistan to evaluate the consequences of the NFC Awards 1991 and 1997. The current study has benefitted with the methodological framework developed in Sabir (2002) which developed two separate equations to estimate the impact of the NFC Award 1997 on the social sector and other service related expenditures (see Appendix). In line with its scope this paper is restricted to the estimation of the following equation derived for social services expenditures.

$$SE = \{(1-a_1)SE_0 - a_1 OE_0\} + a_1(1-a_1)\frac{p_1 Y}{p_2} - a_0 a_1 \frac{p_1}{p_2} + a_1 \frac{(T + G_0 + B^* D92)}{p_2} + \frac{a_2}{1-m}\frac{B^* D91}{p_2}$$

For estimation purposes the above equation can be re-written as

$$SE = c_0 + c_1 \frac{p_1 Y}{p_2} - c_2 \frac{p_1}{p_2} + c_3 \frac{(T + G_0 + B^* D92)}{p_2} + c_4 \frac{B^* D91}{p_2}$$

Where

SE = real per capita social sector expenditures (both recurring and development)
Y = real per capita income
p_1 = General Price Level (CPI)
p_2 = price index of public expenditure
T = per capita total intergovernmental transfers
B = per capita borrowing by the provincial government
m = proportion of the provincial revenue deficit financed by deficit grants
G_0 = lump sum grants
$D91$= capturing the impact of deficit grants and having value 1 prior to implementation 1991 NFC Award afterwards zero
$D92$ = having value zero prior to 1991 NFC Award afterwards 1

Estimated Results

Due to limitation on the availability of the basic data (for example, the data on provincial gross domestic products and inflation are not available), province wise analysis was not possible. Therefore, the above model was estimated for the four provincial governments combined. Annual budget statements of the individual provinces have been used to generate the aggregate database for key provincial budgetary magnitudes. The above equation is estimated for the period 1972-73 to 2007-08. Results of estimation are given in Table 13.

Table 13

Results of Estimation—1973-74 to 2009-10[1]

Dependent Variable—Real Per Capita Social Sector Expenditures

Independent Variable	Constant	P_1Y/p_2	p_1/p_2	$(T+G_o+B+D92)/p_2$	B*D91	DUM
Coefficient	– 0.058	+ 0.018	–1.381	+ 0.194	+0.301	0.908
t-Statistic	(–0.071)	(4.991)	(–2.257)	(4.369)	(4.194)	(10.230)
Adjusted R^2	0.978			Durbin-Watson stat	1.798	

The signs of all the estimated coefficients are theoretically consistent. Each coefficient is significantly different from zero at a 5 percent significance level as apparent from the t-statistics. The value of adjusted R^2 indicates that the first model explains almost 98 percent variation in provincial social sector expenditures. According to the estimated equation an increase or decrease of Rs 100 in either the real federal transfers or lump sum grants or borrowing can affect the social sector expenditures by Rs 19.40 in real terms.

Based on the above estimated equation and projected values of all explanatory variables for 2010-11, social sector expenditures are forecasted for transfers under the NFC Award 2009, the DRGO 2006, the NFC Award 1997 and the NFC Award 1997. Table 14 provides these forecasted values. It indicates that after the NFC Award 1991 transfers under the NFC Award 2009 are likely to cause a higher increase in social sector expenditure. In the absence of a conclusive NFC Award in 2010, DRGO 2006 would have been continued in 2010-11. Therefore, a comparison of social sector expenditure is made with DRGO 2006. As indicated by the last column of Table 14, due to a conclusive NFC Award in 2010, it is expected that spending on social sectors would increase by more than Rs 45 billion.

Table 14

Impact of NFC Awards on Social Sector Expenditures

(Rs Billion)

	Forecast	Difference
DRGO 2006	409.7	0.0
7th NFC Award	455.3	45.6
1997 NFC Award	383.5	-26.2
1991 NFC Award	470.5	60.8

[1]Since the model is based on ratios, non stationary issues did not exist in estimation. This is further investigated by using Augmented Dickey Fuller unit root test in E-views, which confirmed the stationary nature of the variables used in estimation. These results are available on request from the author.

5. CONCLUSION

NFC Awards are regularly set up after every five years under article 160 of the constitution. However, there are fewer examples of conclusive NFC Awards due to lack of consensus among federating units. In this regard, the NFC Award 2009 is a big success of the present democratic regime. This Award successfully made substantial changes in the design of the resource distribution mechanism. It explicitly introduced multiple indicators for horizontal distribution for the first time, allocated higher share of resources to provincial governments and correspondingly lower share to federal government. Given that provincial governments are largely responsible for financing and delivery of social services, this paper makes an attempt to simulate the impact of this increase on social services expenditures. The projected values of social sector expenditures indicate that the NFC Award 2009 has a potentially positive impact on social sector spending. Given that Pakistan has a comparative low spending on social services, this award is a positive move. Hence, it also helps increasing the pace of achieving MDGs targets.

APPENDIX

Methodology Brief

The estimated equation is based on the methodological framework developed in Sabir (2002). A brief description of the major assumptions used in developing micro-theoretic framework is reproduced below.

The methodological framework is based on the assumption that politicians/ officials want to maximise the utility of a typical consumer (median consumer) in their jurisdiction subject to budget constraint. For the sake of simplicity, the consumption basket of a typical citizen (median consumer) can be divided into two broad groups; publicly provided goods and services (A), and privately provided goods and services (B). Utility was assumed to depend positively on the quantity of goods and services provided by the provincial government (A) and on the level of consumption of private goods (B).

$$U = U\,(Q_{A,}\, Q_B)$$

The goods and services provided by provincial government can be divided into social services and, other goods and services

$$U = U\,(Q_S,\, Q_O,\, Q_B)$$

The quantity of demand of each good and services depends upon the expenditure (public/private) on it. In the case of private goods and services, expenditure would be equal to real per capita disposable income of the consumer or $(y - R)$, where y is the real per capita income and R is the real per capita revenue received by the government. Similarly, in case of publicly provided goods and services, expenditure would be equal to provincial government expenditure on social services (SE) and other services (OE). Therefore, the utility function can be rewritten as

$$U = U\,(SE,\, OE,\, Y - R) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

R includes both tax and non-tax revenues, while SE and OE consist of both recurring, and development expenditures on publically provided social services and other services. The payments for servicing of debt are excluded as these do not benefit citizens directly through provision of services.

The sources of revenues for provincial government except its own revenues are federal transfers from the divisible pool, development and non-development grants and borrowings. Therefore, the budget constraint of the provincial government (at current prices) can be expressed as:

$$p_2(SE+OE) = p_1R+T+B+G \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Where Y = real per capita income
R = real per capita provincial revenue (include both tax and non-tax revenues)
SE = real per capita social sector expenditures (both recurring and development)
OE = real per capita other expenditures (both recurring and development)
p_1 = General Price Level (CPI)
p_2 = price index of public expenditure
T = per capita total intergovernmental transfers
B = per capita borrowing by the provincial government

G consisted of two types of grants from federal government to provincial governments. These are lump sum grants (heavily consists of development grants) and deficit grant (heavily consists of non-development and non-obligatory grants). Therefore, by definition, the total flow of grants is given as:

$$G = G_0 + m[p_2(SE+OE) - p_1R - \overline{T} - G_0], 0 \prec m \prec 1 \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

Where m = proportion of the revenue deficit financed by deficit grants.

Deficit grant has played a very significant role in the provincial finances before 1991 but this option was curtailed in the 1991 NFC Award. However, lump sum grants are still provided to the provinces for their development projects.

Substituting (3) into (2) we obtain,

$$p_2(SE+OE) = p_1R+\overline{T}+\overline{G_0}+G_D+\overline{B} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

After addition of p_1y on both sides of the equation (4) the budget constraint can be written as:

$$p_1(Y-R)+p_2SSE+p_2OSE+=p_1Y+\overline{T}+\overline{G_0}+G_D+\overline{B} \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

Based on the above set of equations, a utility maximisation problem can be set up as follows:

$$\ell(R,SE,OE,\lambda) = U(Y-R,SE,OE)+\lambda[I = p_1(Y-R)-p_2(SE+OE)] \quad \ldots \quad (6)$$

Where $I = P_1Y + T + G_0 + G_D + B$

The first order conditions are as follows:

$$\frac{\partial \ell}{\partial R} = -\frac{\partial U}{\partial (Y-R)} + \lambda p_1 = 0 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (7)$$

$$\frac{\partial \ell}{\partial SE} = \frac{\partial U}{\partial SE} + \lambda p_2 = 0 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (8)$$

$$\frac{\partial \ell}{\partial OE} = \frac{\partial U}{\partial OE} + \lambda p_2 = 0 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (9)$$

$$\frac{\partial \ell}{\partial \lambda} = I - p_1(Y-R) - p_2(SE+OE) = 0 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (10)$$

The above derivation based on a micro-theoretic approach provides the information on the signs of partial derivatives of the function, but it needs an explicit utility function for estimation purposes. In the analysis of consumer behaviour, many utility functions were used and among them, we chose the analogous Stone-Geary utility function for the estimation of the model.

$$U = (SE = SE_0)^{\alpha_1} (OE - OE_0)^{\alpha_2} (y - R - y_0)^{(1-\alpha_1-\alpha_2)} \quad \ldots \quad \ldots \quad \ldots \quad (11)$$

$$0 \prec \alpha_1 \prec 1,$$

$$0 \prec \alpha_2 \prec 1,$$

$$0 \prec \alpha_1 + \alpha_2 \prec 1,$$

The Stone-Geary utility function has particular advantages over other functions. The most important advantage of the Stone-Geary utility function is the inclusion of y_0, SE_0, and OE_0, which are "minimum survival bundles" and ensure the subsistence level of consumer demand for public and private goods and services. Substituting the derivatives of utility function into (7), (8) and (9) respectively, yields

$$P_1(Y-R) = \frac{(1-\alpha_1-\alpha_2)U}{\lambda} + P_1 Y_0 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (12)$$

$$P_2 SE = \frac{\alpha_1 U}{\lambda} + P_2 SE_0 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (13)$$

$$P_2 OE = \frac{\alpha_2 U}{\lambda} + P_2 OE_0 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (14)$$

Substituting the value of p_2SE, p_2E and $p_1(Y\text{-}R)$ from (12), (13) and (14) into (5) we obtained

$$\frac{U}{\lambda} = p_1(Y - Y_0) + T + G_0 + \frac{B}{1-m} - p_2(SE_0 + OE_0) \quad \ldots \quad \ldots \quad \ldots \quad (15)$$

Minimum bundle of income y_0 was assumed to be partly constant and partly rises with income y.

$$y_0 = \alpha_0 + \alpha_1 y$$

Therefore, Equation 15 can be written as:

$$\frac{U}{\lambda} = (1-\alpha_1) p_1 Y - \alpha_0 p_1 + T + G_0 + \frac{B}{1-m} - p_2(SE_0 + OE_0) \quad \ldots \quad \ldots \quad (16)$$

After substituting the value from Equation 16 into 12, 13 and 14, we finally have the following system of equation for estimation:

$$p_2 SE = \alpha_1(1-\alpha_1)p_1 Y - \alpha_0\alpha_1 p_1 + \alpha_1(T+G_0) + \frac{\alpha_1}{1-m}B + \{(1-\alpha_1)SE_0 - \alpha_1 OE_0\}p_2 \quad \ldots \quad (17)$$

$$p_2 OE = \alpha_2(1-\alpha_1)p_1 Y - \alpha_0\alpha_2 p_1 + \alpha_2(T+G_0) + \frac{\alpha_2}{1-m}B + \{(1-\alpha_2)OE_0 - \alpha_2 SE_0\}p_2 \quad (18)$$

$$p_1 R = (\alpha_1+\alpha_2)(1-\alpha_1)p_1 Y - \alpha_0(\alpha_1+\alpha_2)p_1 - (1-\alpha_1-\alpha_2)(T+G_0) - \frac{(1-\alpha_1-\alpha_2)}{1-m}$$
$$B + (1-\alpha_1-\alpha_2)(SE_0 - OE_0)p_2 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (19)$$

Equations (17) and (18) are the desired expenditure equations. Divided both equations by p_2 we have the following functional form:

$$SE = \alpha_1(1-\alpha_1)\frac{p_1 Y}{p_2} - \alpha_0\alpha_1\frac{p_1}{p_2} + \alpha_1\frac{(T+G_0)}{p_2} + \frac{\alpha_1}{(1-m)}\frac{B}{p_2} + \{(1-\alpha_1)SE_0 = \alpha_1 OE_0\} \ldots \quad (20)$$

$$OE = \alpha_2(1-\alpha_1)\frac{p_1 Y}{p_2} - \alpha_0\alpha_2\frac{p_1}{p_2} + \alpha_2\frac{(T+G_0)}{p_2} + \frac{\alpha_2}{(1-m)}\frac{B}{p_2} + \{(1-\alpha_2)SE_0 = \alpha_2 SE_0\} \quad (21)$$

After 1991 NFC Award value of m became zero

$$SE = \alpha_1(1-\alpha_1)\frac{p_1 Y}{p_2} - \alpha_0\alpha_1\frac{p_1}{p_2} + \alpha_1\frac{(T+G_0+B*D92)}{p_2} + \frac{\alpha_1}{(1-m)}\frac{B*D91}{p_2}$$
$$+\{(1-\alpha_1)SE_0 - \alpha_1 OE_0\} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (22)$$

$$OE = \alpha_2(1-\alpha_1)\frac{p_1 Y}{p_2} - \alpha_0\alpha_2\frac{p_1}{p_2} + \alpha_2\frac{(T+G_0+B*D92)}{p_2} + \frac{\alpha_2}{(1-m)}\frac{B*D91}{p_2}$$
$$+\{(1-\alpha_2)SE_0 = \alpha_2 SE_0\} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (23)$$

The value of D91 is 1 prior to 1991 NFC Award otherwise zero and the value of D92 is 1 after the 1991 NFC Award, otherwise zero.

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The Effect of Corruption and Governance on Tax Revenues

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1. INTRODUCTION

Developing countries are typically unable to generate sufficient amount of revenue from taxation because these countries face a number of institutional problems in the process of revenue generation. One of the main problems is corruption in tax administration. The two important components of revenue generation are tax administration and tax system reforms [Brondolo, *et al.* (2008)]. The main objective of these is to increase the efficiency of tax administrations, specifically by reducing corruption and tax evasion. The second main problem of low revenue generation is political instabilities in developing countries. One of the important characteristics of political instability is unstable and governments and, hence, incoherent policy framework, which hinder in the process of long-term reforms in the system.

The quality of governance as a whole is also relevant in this context. It is widely agreed that the presence of tax evasion and corruption of public officials is a social phenomenon that can significantly reduce tax revenue and seriously hurt economic growth and development.

Corruption cannot be viewed in isolation, as it is a part of the broader issue of governance and public management. The quality of a country's governance is a critical factor for its development process. It is thus surprising how very little attention is given to one of the most fundamental drivers in the way that public revenues are raised. Bird, *et al.* (2008) indicate that tax structure is highly responsive to governance structure; high income countries can improve their tax performance through improving their governance structure.

Various studies try to investigate the determinants of tax revenues [e.g., Teera (2003); Weiss (1969); Tanzi and Zee (2000) and Imam and Jacobs (2007)]. Imam and Jacobs (2007) explain that real per capita income, share of agriculture in GDP, trade openness, inflation and corruption are the most important determinants of tax collection. Gupta (2007) finds that several structural factors like per capita GDP, share of agriculture in GDP, trade openness foreign aid, foreign debt and some new institutional variable like corruption and political stability are statistically significant and strong determinants of revenue performance. The main difference between these studies and the analysis

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undertaken in the present study is that we consider some additional variable that can potentially affect tax revenues. The new variable is governance.

In this study we analyse the effect of institutional and structural variable (corruption and governance) on tax revenues in selected developing countries, using panel data set for 25 developing countries for the period 1990-2005. The most important contribution of this study is that it extends the model presented by Imam and Jacobs (2007) by employing other institutional variable which may also affect tax revenues. Imam and Jacobs (2007) consider corruption as a potential institutional variable that can affect tax revenues, but the present study also considers governance as an additional factor that may have affect tax revenues. We carry out GMM estimation technique for the 1990-2005 periods for 25 developing countries: Argentina, Bolivia, Brazil, China, Columbia, Cote-devorie, Ecuador, Egypt, Hungry, India, Indonesia, Jordon, Lebanon, Mexico, Nigeria, Pakistan, Peru, Philippines, Russian Federations, South Africa, Thailand, Turkey, Ukraine, Uruguay and Venezuela.

The rest of the study is organised as follows. In Section 2 we review a few studies that provide theoretical and empirical background of the present study. In Section 3 we explain the methodology. Section 4 explains the data and variable construction and estimation technique. Section 5 comprises of the results and discussion of this study. In Chapter 6 we conclude the study.

2. LITERATURE REVIEW

In the area of public service, the incentives of being engaged in corrupt behaviour are high for both officials those who can enrich themselves by taking bribe and bribe payers who want to obtain undue benefits such as tax evasion, winning of contracts, etc. evade taxes. The area of taxation, regulations are often so complex that tax payers have great incentives to indulge in corruption. The complexity of tax system also allows official to use their flexible powers and mount corruption in the system.

Sandmo (2004) defines the concept of tax evasion in the following words. "Tax evasion is a violation of the law: When the taxpayer refrains from reporting income from labour or capital which is in principal taxable, he engages in an illegal activity that makes him liable to administrative or legal action from the authorities".

Various studies explain that collection of tax revenue is one of the important areas where corruption is most likely to arise [Galtung (1995); Li (1997); Toye and Moore (1998); Tanzi (2000); Fjeldstad and Tungodden (2003)]. Some of the factors that contribute to corruption in tax system are as follows.

- A complex and fragmented tax system increases the demand for corruption. Tax auditors and tax payers get advantages through complex rule, unclear laws, regulations and procedures of tax system. Complexity of regulation allows to the official to use their flexible powers and mount corruption in the system.
- Complexity in paying tax leads to corruption (tax payer save their time and reduce uncertainty).
- Another factor that fosters corruption is high tax rates, it increases the incentive for tax payer to evade tax.

- To indulge in corrupt behaviour individuals compare their benefits with the risk of detection and punishment, they engage in corrupt activities if they feel that the expected punishment is low.
- Low wages of tax administrator and tax payers also foster corruption.

Fjeldstad (2005) examines the experiences of the Uganda Revenue Authority (URA) in controlling fiscal corruption. There are many explanatory factors involved in fiscal corruption. The study concludes that several factors have contributed to the unsatisfactory results of the URA. The study also explains that pay level of employees in URA is one of the several factors affecting the behaviour of tax officers.

Recent literature shows that in case of poor countries inducing more fiscal corruption may paradoxically lead to lower level of tax evasion and higher level of tax revenues, but Fjeldstad and Bertil (2001) explain that this paradox does not justify policies to stimulate corruption. It analyses that in the short run corruption may raise tax revenue but in the long run the opposite will be the case.

The impact of corruption and of tax evasion on tax revenue is not new in the field of public finance .In a series of paper, Tanzi and Dvoodi (1997) have provided evidence that countries with high level of corruption tend to have lower collection of tax revenues in relation to GDP. The implication is that some of the taxes paid by taxpayers are diverted away from public accounts. Tanzi (1999) argues that a distinction needs to be made between taxes collected by the tax administrators and taxes received by the treasury.

When corruption becomes prevalent then higher tax rate leads to smaller net revenues. Sanyal, *et al*. (1998) investigates the relationship between corruption, tax evasion and laffer curve. The study explains that a corrupt tax administration leads to laffer curve behaviour (a higher tax rate leads to a smaller net revenue). The study explains that "net revenue earned from a truth revealing audit probability always exceeds net revenue through audits, taxes, and penalties in the cheating region".

In case of developing countries corruption is widespread and its consequences for the tax system are destructive.[2] It shrinks the state revenues and thus reduces the ability of state to fulfil its obligations to society. This is something alarming as many studies regarding tax system in developing countries show that more than 50 percent of tax revenue goes uncollected because of fiscal corruption and tax evasion [Richupan (1984); Alm, *et al.* (1991); Bird (1990, 1992) and Krugman, *et al.* (1992)]. The losses in revenues and thus subsequently in public spending are high as compared to the proportion of the amounts paid as bribes. Another undesirable consequence of corruption is that it reduces the distributive function of tax collection and hence contributes to increase income inequality.

The problem of tax evasion and corruption have been addressed separately, less attention has been paid to their combined effect. Hadi (2006) has taken an effort to see the relationship between corruption and tax evasion. This study analyses that how bribery affects tax evasion. It also explains how tax-payers would be tending to pay bribes to maximise their expected income. The study used three different groups of people, individual taxpayers, tax collectors, and inspectors. The results shows that size of bribe negatively affect the tax evasion.

[2]For details, see Novartis Foundation—Sustainable Development Programme.

There are a number of studies available on the behaviour of the taxpayer less attention has been paid to the behaviour of the fiscal officers, their service situation, and their incentives. Chand and Karl (1999) examined the issue to control fiscal corruption by providing incentives to fiscal officers. A model is developed to expose the incentive effect. This study explains the importance of organisational setup and conditions of service of fiscal officers. The study concludes that corruption has to be done due to low wages and other social circumstances.

Good governance brings good tax system. There are three main elements in order to build a good tax system, which includes state legitimacy, taxpayers' willingness to pay tax, and the effectiveness of tax administration. Phillips and Sandall (2008) explain the relationship between governance and tax reforms. The study explains that three key dynamics reflects the relationship between governance, taxation and investment climate. Firstly good tax system positively depends on good governance. Secondly a fair domestic taxation system promotes good governance because efficient tax system allows population to pay fairly.

Revenue collection depends positively on well organised administration; trust in government, and political stability. Theoretical considerations suggest that greater political instability and polarisation reduce the efficiency of the tax collection system. Aizenman and Yothin (2005) explain that collection efficiency is determined by the penalty on underpaying and probability of audit. Their main purpose is to prove the dependence of VAT collection efficiency on some key structural and political economy factor. The study shows that collection efficiency of the value added is affected by economic structure that increases the cost of enforcement. The collection efficiency reduces with less urbanisation, less trade openness and higher share of agriculture.

3. METHODOLOGY

A number of empirical studies have explored the factors that can affect tax revenue in developing or developed countries and several factors have been identified. Weiss (1969) explains that the general level of economic development, the administrative and political constraints on the fiscal system, social-political values, indigenous institutions, popular desires for government spending, and other factors are involved in determining the magnitudes of tax revenues in a country.

Teera (2003), Tanzi and Zee (2000) explained that the revenue generating capacity of different taxes in an economy can be determined by using per capita income, share of agriculture output in GDP, share of mineral exports in GDP, openness of the economy and the ratio of money to GDP. Imam and Jacobs (2007) explained that real per capita income, share of agriculture in an economy, openness, inflation and corruption were the most important determinants of a tax.

Gupta (2007) investigates the revenue performance of a set of developing countries over the past 25 years. The study finds that several structural factors like per capita GDP, share of agriculture in GDP and trade openness are statistically significant and strong determinants of revenue performance. The study also analyses the impact of foreign aid, foreign debt and the institutional variable like corruption and political stability on tax revenue.

The present study mainly follows the framework of Gupta (2007) but it also considers some additional variables that can potentially affect tax revenues. The main difference between the present study and Gupta (2007) is that we analyse the effect of institutional variable on individual taxes while in later study taxes are taken in total revenue form. Following is the list of variables considered in this study.

The Level of Economic Development

Theoretical literature explains that the tax revenue share rises with the level of economic development.[3] Per capita income is used as a measure of development. The literature on tax revenue system reveals a positive relationship of total tax revenue and income tax as a percent of GDP with per capita income. A higher per capita income leads to a higher level of development, which ultimately generates a higher capacity to pay taxes as well as a greater capacity to levy and to collect them [Chelliah (1971)]. Most of the studies show that it is expected to be positively correlated with tax share.

Trade Openness

Trade openness reflects the degree of exposure of an economy to external economic influences. Rodrik (1998) and Gupta (2004) explains that there is a strong positive correlation between trade openness and the size of the government, as societies demand an expanded role for the government in providing social insurance in more open economies subject to external risks.

Sector-wise Composition of GDP

In an economy sector-wise composition of output matters because certain sectors of the economy are easier to tax than others. The agriculture sector may be difficult to tax, especially if it is dominated by a large number of subsistence farmers. Share of agriculture and industrial sectors in GDP are considered to be two good indicators of the structure of an economy. Tanzi (1992) asserts that a country's economic structure is one of the factors that could be expected to influence the level of taxation. The study also explains that in the case of developing countries agriculture sector has an important influence on tax revenue from both demand and supply sides. A higher agriculture share lowers the revenue performance.

Inflation

Changes in macroeconomic policies environment plays an important role in raising tax revenue, inflation is a good proxy used to measure the economic policy environment. It captures the effect of macroeconomic policy. The literature regarding the impact of inflation on taxation is extensive and it may be difficult to describe this phenomenon. Some past literature shows that high inflation increases the rate of tax, but recent literature shows that this dilemma depends on collection lags. Tanzi (1977) explains that the combination of high inflation, a relatively long average lag in tax collection, and a low elasticity of the tax system leads to a drastic fall in real revenues when inflation occurs.

[3] See, for example, Tanzi (1992).

Corruption

Recently, some studies have attempted to look at the importance of institutional factors in determining revenue performance. Bird, *et al.* (2004) finds that factors such as corruption, rule of law, entry regulations play key role in tax revenue determination. Gupta (2007) explains that corruption has a significantly negative effect on revenue performance.

Governance

"Governance is the method of "governing" that is proposed for obtaining lasting economic, social and institutional development, promoting healthy equilibrium amongst the State, civil society and the economic market, and generating expressly for this purpose active involvement by citizens".[4]

Revenue collection depends on efficiency of government. Good governance brings good tax system; governance has positive relation with tax system. An improved tax to GDP ratio can be achieved by using a combination of good governance, improved tax administration, best macroeconomic policies and other discretionary tax measures. One serious concern for governance is the interactions between tax policy and the legitimacy of governments and the policies they pursue. Benno (2003) suggests that direct democratic rights, local autonomy, trust in government and courts and the legal system have a significantly positive effect on tax morale.

In light of above discussion we now propose the following econometric model describing the tax to GDP ratio as a function of a number of variables. The model is given by:

$$\frac{Tax_{ij}}{GDP_{it}} = \alpha_0 + \beta_{1j} CORR_{it} + \beta_{2j} GOV_{tt} + \beta_{3j} OPEN_{it} + \beta_{4j} CPI_{it} + \beta_{5j} \ln PCI_{it}$$

$$+ \beta_{6j} AGR_{it} + \beta_7 IND_{it} + \beta_8 \frac{Tax_{it-1}}{GDP_{it-1}} + \mu_i + \varepsilon_{itj} \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

The notations used in the above equation are defined as follows.

In the equation *i* refers to a country, *t* refers to a year and *j* refers to the coefficient which can differ between different categories of taxes.

$\frac{Tax_{ij}}{GDP_{it}}$ is a tax revenue to GDP ratio

CORR_{it} represents the corruption index

Gov_{it} represent the Governance index

$OPEN_{it}$ defined as export plus imports as ratio to GDP

lnY_{it} represents the natural logarithm of real per capita income

AGR_{it} stands for share of agriculture in a country

CPI_{it} is consumer price index, μ_t stands for country effect and ε_{itj} is an error term.

[4]This definition of governance is provided by the Royal Academy for the Spanish Language.

4. DATA AND ESTIMATION PROCEDURE

This section explains the list of variable that are included in our analysis and also the construction of these variables. First we explain the list of independent variable, in which both structural and institutional variables are included and the construction of theses variables that influence the level of tax revenues.

4.1. Structural Factors

Agriculture plays a central role in any economy development, it contribute a large share to the GDP. Share of Agriculture is determined by overall value added in agricultural sector divided by GDP.

Per capita income is known as a good indicator for the overall development of the economy. Real per capita is measured by the ratio of GDP at constant prices in local currency to population.

We use the outcome measure of trade openness, that is export plus imports divided by GDP, all measured at current prices in local currency.

Inflation is used as a proxy for expansionary monetary and fiscal policy. It captures the effect of macroeconomic policy. Inflation is measured by taking the annual growth rate GDP price deflator.

4.2. Institutional Factors

Corruption is defined as the abuse of public power for private benefit. It is captured by an index that measure the extent to which bribes are generally expected by government officials in relation to, inter alia, tax assessments, trade licenses, and exchange controls [Tanzi (1998)].

The Corruption Perception Index (CPI) compares every year the levels of corruption among public officials and politicians in a wide range of countries around the world. The index is based on the perception of business people and country analysts. The CPI is an index of indices which is composed of nine different indicators that all provide ranking of countries based on expert assessments and opinion surveys. Changes in the scores or ranking may be attributing to factors others than changes in actual levels of corruption.

The Worldwide Governance Indicators (WGI) is formed by the World Bank Research Institute. There consist of six aggregate indicators of governance covering 200 countries, with cross country data from 30 organisations including the sources used for the CPI. The data on Governance are constructed by using six variables (1) voice and external accountability; (2) political stability and lack of violence; (3) government effectiveness; (4) lack of regulatory burden; (5) rule of law; and (6) control of corruption.

Dependent variable is tax revenue ratio to GDP: as an adequate volume of government revenue is essential for public expenditure and economic growth, the ratio of tax revenue to GDP has been used to measure and judge the success of a country's fiscal management.

To see the effects of corruption and governance and the other variables on tax revenue, as explained in Section 3, we require cross-sectional as well as time series data. We use a panel data in order to have sufficient number of observation in econometric exercise.

The study uses a panel dataset that covers 25 developing countries over a 16 years period: 1990–2005. The countries are chosen on the basis availability of data, are Argentina, Bolivia, Brazil, China, Columbia, Cote-devorie, Ecuador, Egypt, Hungry, India, Indonesia, Jordon, Lebanon, Mexico, Nigeria, Pakistan, Peru, Philippines, Russian Federations, South Africa, Thailand, Turkey, Ukraine, Uruguay and Venezuela. The data on different variables are taken from a variety of sources, the detail of different sources is explained below.

Data on total tax revenues are taken from *World Development Indicator* (1990–2005). *International Country Risk Guide* (ICRG) provides data on political risk indicators for 140 countries for the period 1984–2007. In our analysis we use the index on political risk and corruption. Data on corruption are taken from *International Country Risk Guide* (1990–2005). Data on governance are taken from *Worldwide Governance Indicators* (1990–2005). The *World Development Indicators* provides comprehensive dataset about macroeconomic variables. WDI is the main source of data on different economic variables like per capita income, agricultural share, Industrial share, CPI and openness.

4.3. Estimation Technique

We use Generalised Method of Moments (GMM) for the estimation of Equation 1. GMM estimation technique controls the endogenity of regressors and the country specific effect. GMM also helps to controls for possible specification bias when variables are highly persistent over time.

Endogenity arises when right hand side variable are correlated with the random error term of the equation. Model uncertainty arises when we cannot fully capture the determinants of tax revenues.

In Equation 1 the primary reason for endogenity is that the lagged dependent variable appearing on right hand side of the equation is correlated with the country specific random effect μ_i. One way to handle this problem is to estimate Equation 1 by GMM using lagged first differences of all potentially endogenous variables along with exogenous variables as instruments. Another approach is to estimate Equation 1 in first difference form by GMM using lagged level of variables as instruments. The third approach, which is considered superior to the first two approaches, is to combine the first two approaches by stacking the level equation with the first difference equation, thus using twice as many observations as used in each of the first two approaches. These details are available in Greene (2004).

5. RESULTS AND DISCUSSION

According to the objective of our study, we examine whether across-country and over time variation in the taxes can be explained by institutional and structural factors. We use GMM technique as explained in Section 3.

The regression result for total tax is presented in Table 1. Before going to the detail of the result, it is essential to establish the overall credibility of the results. Since R^2 is not a valid statistic as it does not necessarily lie in the [0,1] range, we use χ^2 statistic for Wald test on the null hypothesis that all the slope coefficients are equal to zero, The value of χ^2 statistics are highly significant in all the six equations, confirming that the overall fit of the equations is quite satisfactory.

We also apply Hanson test to confirm validity of the restriction. The test is based on Chi-square statistic with degree of freedom equal to the number of excess instruments (i.e., the number of instruments minus the number of parameter to be estimated). The value of this Chi-square statistic is statistically insignificant, conforming acceptance of the null hypothesis.

Finally, we report Durban Watson statistic for the regression equation in first difference form. The table shows that the value of DW statistic is somewhat on the higher side, indicating presence of mild negative autocorrelation. This is the typical result of estimating the equation in first difference form. In first difference form first order autocorrelation coefficient can be equal to zero only when the first order autocorrelation coefficient in the level equation is exactly equal to one. Since in the level form autocorrelation will typically be positive and high but not perfect, this will translate into mild negative autocorrelation in the first difference form.

We now discuss the result in some detail for the regression results reported in the table. Table 1 shows that for total taxes the regression coefficient of per capita income is very small and highly insignificant. This means that, other things held constant, total taxes are proportional to GDP. Another interpretation is that contrary to a prior expectation, the tax to GDP ratio does not seem to increase with economic development as indicated by per capita income. The reason could be that the level of development experienced in the sampled countries in the given short period of time may not have been enough to exert any effect on the tax generating capacity.

The regression coefficient of the share of industrial sector in GDP is positive and significant, indicating that the composition GDP matters and industrial sector contributes relatively more to taxes. The value of regression coefficient shows that, for example, as a share of industrial sector in GDP increases by 10 percentage points, tax collection as a percentage of GDP increases by 3.15 percentage point.

The regression coefficient of corruption variable is negative and significant, while that of governance variable is positive and significant. Both these results are in conformity with our a prior expectation that corruption cause significant leakages in tax revenue and good governance can plug-in some of these leakages by contributing to better administration and management in public sector department including the ones responsible for tax collection.

The AR (1) coefficient is positive and significant, meaning that the first order autoregressive process successfully remove autocorrelation form the regression residuals.

Table 1

GMM Estimates of Total Tax Revenue Equation

Explanatory variable	Coefficient	*t*-value
Constant	–0.052	–0.790
Log (PCI)	–0.001	–0.277
Share of Industrial Output in GDP	0.315	2.696*
Corruption	–0.007	–2.252*
Governance	0.002	5.366*
AR(1) Coefficient	0.397	3.780*
Chi-Square Statistic for Wald Test	59.872*	
Chi-Square Statistic for Hanson Test	11.196*	
DW Statistic	2.077	

Note: Statistics significant at 5 percent and 10 percent level are indicated by * and ** respectively.
The Wald test is applied on the restriction that all regression coefficients other than the intercept are equal to zero.

7. CONCLUSION AND POLICY IMPLICATION

In this study we have analysed the effects of institutional variables (corruption and governance) and structural variables (per capita income, share of industrial output in GDP, share of agriculture in GDP, inflation and trade openness) on total tax revenues in selected developing countries, using panel data set for 25 developing countries over the period 1990-2005. All estimates are based on GMM applied to dynamic panel model in level and in first difference form.

The main contribution of this study is that it extends the model presented by Imam and Jacobs (2007) by including the institutional variable governance, which is found to have significant effect on tax revenues.

The GMM regression results show that institutional variables have significant effect on tax revenues. The study concludes that governance and corruption are two main determinant of tax revenue. Corruption has adverse effect on tax collection, while good governance contributes to better performance in tax collection. The study concludes that corruption has negative and significant effect. Governance has positive and significant effect on tax revenues, this shows that good governance brings good tax system; governance has positive relation with tax system.

In developing countries tax revenue collection depends on efficiency of government. Thus the voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption and are important factors in determining tax revenues in developing countries. An improved tax to GDP ratio can be achieved by using a combination of good governance, improved tax administration, good macroeconomic policies and other discretionary tax measures.

Although structural variables like per capita income, trade openness, industrial share and inflation also play important role but different variables have different effects.

The results may have implications for governments internationally when consideration is given to the issue of effective tax administrations. Efforts need to be made by governments to make improvements to the governance (voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption) as a starting point. Fiscal corruption in the tax administration is reduced by required laws, which are vigorously enforced by independent and efficient judicial system. Also, when democratic political institutions are in place, taxpayers are allowed to freely express their opinion about the tax system, so tax administrations should become more transparent and publicly accountable, hence fiscal corruption is more easily exposed. Developing countries need actively to strive to reduce the opportunities of corruption in tax administration and change the incentive structure for tax officials.

Another implication is that international donors like IMF may benefit in achieving its objectives if it adopts eradication of corruption as the prime component of ‘conditionalities’, which are almost always attached to their programmes of soft loans.

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Fiscal Decentralisation in Pakistan

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INTRODUCTION

Fiscal decentralisation is considered as an important policy instrument to achieve economic efficiency and ensure effective governance through financial autonomy of provincial governments. It integrates the smaller units of federation and ensures their participation in the economic development of country while at the same time capacitate the central government to fulfil the national level tasks more efficiently and effectively. It is considered as an important growth accelerating measure. It empowers the lower level governments through financial autonomy and administrative empowerment.

Devolution helps the lower tiers of government to act as a powerful administrative agent of the central government. However, decentralisation helps units to be more innovative, responsible and efficient as they have more autonomous status. Decentralisation policy is believed to positively affect economic growth because it envisage better derivation and implementation of social policies. The decentralised setup of the government does not have any information barriers and lower level of government is better positioned to know the basic necessities and developmental needs of the people that are living in different regions of a country. Decentralisation brings up the true potential of a locality with the efficient resource exploration and its efficient utilisation. It furthers competition among the competing constituencies for better service provision which results in higher efficiency. This all has the potential to positively influence economic growth.

Fiscal decentralisation can help in better targeting and can eliminate unnecessary engagements of the central governments. In the words of Bird and Smart (2002), "*for services to be effectively provided, those receiving transfers need a clear mandate, adequate resources and sufficient flexibility to make decisions*". Decentralisation is the process through which the responsibilities as well as resources from national to sub national[1] governments are devolved [Rondinelli (1981)]. Thus, by decentralisation, central government empower the sub national governments in

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[1]In this discussion the provincial, states and sub-national level of governments will be used interchangeably.

such a manner that can help in better use of resources, improve public living standards and at the same time to share the work load [Gordin (2004)]. Nevertheless from financial point of view, decentralisation may pose danger if it is weakly designed so that provinces are able to externalise their costs to others [Rodden, *et al.* (2002); Von Hagen, *et al.* (2000)].

Pakistan is federal country with a centralised taxation system. Federal government collects bulk of resources and then redistributes it among the federal and constituent parts to correct both vertical and horizontal fiscal imbalances. In Pakistan, the system of fiscal resource distribution is guarded by law and an autonomous body i.e., National Finance Commission (NFC) is constituted by law, after every five years time, to ensure transparent and judicious resource distribution. However, at times different problems interrupted the mechanism and current fiscal resource distribution did not prove up to the mark. Deadlocks were experienced at times and hence NFC failed to deliver undisputed awards to settle vertical and horizontal resource gaps.

The Present study aims to identify the strengths and weaknesses of the current fiscal resource distribution system in Pakistan, through the compilation of its historical trends. Proper information regarding the prevailing resource distribution system is believed to result in better policy formulation and thus would ultimately help the country to catch the development path faster. In this connection, it is also necessary to analyse the effects of current resource distribution policies on the economic growth of the country. Thus, this study helps in identifying the degree of financial autonomy of the sub national governments and quantify its long run returns.

LITERATURE REVIEW

Importance of the relationship between fiscal decentralisation and economic growth is depicted by the amount of literature available on this topic. Extensive material is found exploring various important relationships. However, differing results were obtained at the estimation stage owing to the variables and data under analysis. Similarly, different results are found for the developed and developing economies. Even in the case of Pakistan, studies still has to find clear relationship between fiscal decentralisation and economic growth.

Davoodi and Zou (1998) developed a theoretical model for explaining the relationship between fiscal decentralisation and economic growth. For empirical testing, they have used time averaged panel data for 46 countries from 1970 to 1989. In the case of developing countries a negative association is found between fiscal decentralisation and economic growth.

Zhang and Zou (1998) used the China's provincial panel data for year 1978–92 and found that there is a negative relationship between the degree of fiscal decentralisation and provincial economic growth.

Phillips and Woller (1997) studied the relationship between economic growth and fiscal decentralisation for the sample of seventeen developed countries and twenty three less developed countries for the period from 1974 to 1991. For the developed countries they found weakly significant, negative relationship between revenue decentralisation and economic growth. However, they fail to prove any relationship between the two variables in the case of less developed countries.

Xie, Zou and Davoodi (1999) found a highly insignificant relationship between fiscal decentralisation and economic growth for the United States. Authors attributed it to the fact that the country has already achieved an optimal level of fiscal decentralisation and thus further decentralisation may be detrimental to economic growth.

Thieben (2001) used the OECD countries cross sectional data for the period from 1975-95. He analysed the benefits and short comings of fiscal decentralisation for these countries. The study could not found any relationship between economic growth of the OECD countries and the degree of revenue decentralisation of the sub-national governments.

Contrary to the above stated review, Lin and Liu (2000) concluded that fiscal decentralisation has made positive effects on provincial economic growth in the case of China. They used the provincial panel data of twenty eight provinces of China for the period from 1970 to 1993. The authors observed that fiscal reforms played an important role in the impressive growth of China.

Another interesting observation was made by Mello and Barenstein (2001) which used the cross country data for 78 countries for 1980-92. The study concluded that as the share of non-tax revenues, grants and federal transfer increases in the total sub-national revenues, the association between decentralisation and governance becomes stronger.

Resource Distribution System in Pakistan

Pakistan has a federal system. It is a country with strong federal government. Currently there are three levels of government working in Pakistan i.e., the federal, provincial and the local (district) level governments. Due to the efficiency and distributional issues, the resource sharing mechanism always remained under debate.

According to Jaffery and Sadaqat (2006), the systematic resource transfers take place at four stages. At the first stage the National Finance Commission (NFC) awards decides the revenue distribution between the federal and provincial governments. At the second stage, Provincial Finance Commission (PFC) delegate resources from provincial to local levels. Following this as a third stage transfers are made from federal to local levels and finally the vertical resource sharing occurs at local levels i.e. from District Government to Tehsil Municipal Administration. On the contrary, the random transfers take the shape of special grants, discretionary funds for executives, the parliamentarian development funds and likewise. However, in this study our emphasis will remain on the fiscal relations between federal and provincial government.

Without sufficient knowledge regarding the history of resource distribution, it is hard to identify related bottlenecks related to resource distribution mechanism. This section summarises all the awards presented during the course of time after independence. The over time development is then discussed on the basis of historical analysis [Ahmed, *et al*. (2007)].

Niemeyer Award

Under the 1935 Act of United India, the Niemeyer Award was being followed for resource distribution between the centre and provinces. According to this award, an important tax i.e. sales tax was levied and collected by the provincial governments. In the case of income tax, 50 percent of the total collection was reallocated to the provinces.

After 1947, when Pakistan came into being, the same arrangements were followed till March 1952, although some adjustments were made in railway budget and sharing of income and sales tax [Pakistan (1991)].

Raisman Award

The Raisman award was presented in December, 1947 [Pakistan (1991)]. The Raisman award made special arrangements to cover the poor financial position of the federal government. Fifty percent of sales tax was allocated to the federal government as an ad hoc measure. Provinces were allocated 50 percent of income tax, out of which 45 percent was allocated to East Pakistan while the rest was divided among the provinces of Punjab, Sindh, Khyber Pakhtunkhwa, Bhawalpur, Khairpur, Balochistan states union and residual[2] as 27, 12, 8, 4, 0.6, 0.6, and 2.8 percent, respectively [Pakistan (1991)].

Revenue Sharing Under One Unit

During the implementation period of Raisman award, in year 1955, all the four provinces of West Pakistan were merged and declared one unit. Hence, after 1955 the whole country was declared two identities only i.e., East Pakistan and West Pakistan. During the era of One Unit, two awards were announced i.e., of year 1961 and 1965.

National Finance Committee 1970

In April 1970, for the first time a committee (instead of a commission) was designated to work under the federal finance minister and give recommendations for amicable Intergovernmental resource allocation. The resource pool was reshuffled. The committee recommended that vertical resource distribution between federal and provincial governments should be 20:80 percent, respectively. Once again, 30 percent of the allotted sales tax was redistributed among the provinces according to the collection from the respective areas.

Financial Arrangements in 1973 Constitution

In 1973, the new constitution of Pakistan was agreed upon by the National Assembly and implemented. In the new constitution, special arrangements were made to make the resource distribution mechanism smooth and acceptable. According to the 1973 constitution, it was obligated upon the federal government to constitute the NFC after each five years time. The finance commission was designated to suggest and review the resource distribution mechanism in Pakistan. Hence with the new statutes, an effort was made to ensure an amicable resource distribution.

The 1st NFC Award 1974

The first NFC was established under the new constitution in 1974. Under this commission the DP consisted of only sales tax, income tax and export duty on cotton. Population was adopted as only criterion for horizontal resource distribution among the provinces. The vertical resource distribution remained as of the previous award. With the

[2]The states which were believed to join Pakistan later after independence.

adoption of population as the single criterion for resource distribution, the provincial share of Punjab increased to 60.25 percent of the total provincial share. Thus with the non diversification of formula, the smaller provinces were affected negatively.

The 2nd NFC Award 1979

Following the 1974 award, the 2nd NFC award was set up by the government of President General Zia-ul-Haq, in 1979. Hence the revised resource shares for the provinces announced under the 1979 NFC award are presented at Table 1.

Table 1

Provincial Share 1979 Award

(Percent)

Punjab	Sindh	Khyber Pakhtunkhwa	Balochistan
57.97	23.34	13.39	5.30

Source: Pakistan (2006b).

The 3rd NFC Award 1985

This NFC remained unable to recommend any improvement in distribution mechanism. The resources continued to be distributed in the light of the 1974 NFC award with the amended provincial population.

The 4th NFC Award 1991

The fourth NFC award was formed in 1990 by the democratic government of Mr Nawaz Sharif. The commission finalised its recommendations in April, 1991. This award was considered an important achievement because it achieved success after a gap of almost 16 years. This award came up with a number of positive recommendations. Most importantly the resource pool was expanded with the inclusion of more taxes in the DP. Thus, according to the 1991 NFC award, the horizontal resource share of the provinces registered a growth of 17 percentage points (i.e., increase from 28 percent to 45 percent of federal tax revenues), [Ghaus and Pasha (1994)]. The resources were allocated among the provinces in accordance with their population size, which is presented at Table 2.

Table 2

Provincial Share-1991 Award

(Percent)

Punjab	Sindh	Khyber Pakhtunkhwa	Balochistan
57.88	23.28	13.54	5.30

Source: Pakistan (1991).

The 5th NFC Award 1997

This NFC award was announced in second month of 1997. The DP was further expanded with the inclusion of all taxes and duties. It now comprised of sales tax, income tax, wealth tax, capital value tax, custom duties, export duties, excise duties (other than

duty on gas that is charged at wellhead), and all other taxes that were levied or collected by federal government at that time. Similarly, royalties on crude oil and net development surcharges on natural gas were extended to the provinces in the shape of straight transfers. In addition, this commission also announced the incentive of matching grants[3] to the provinces [Pakistan (1997)].

The 6th NFC Award 2000

Despite having problems at the implementation stage, the two NFC awards of 1991 and 1997 remained successful in bringing improvements in the resource distribution mechanism. The 6th NFC for year 2000 was constituted by General Pervaiz Musharraf, the then President of Pakistan. The centre was insisting 45 percent out of DP but the provinces were demanding 50 percent of share. It completed its tenure without any success.

The 7th NFC Award 2006

After the unproductive ending of the 6th NFC, new commission was nominated on 21st July, 2005. Nevertheless, the deadlock still prevailed among the stake holders. The commission faced difficulties in achieving consensus for amicable resource distribution mechanism. Therefore, as a last option, under the Article 160(6) of the 1973 constitution of Islamic Republic of Pakistan, all the chief ministers of the provinces vested the authority to the President for declaring an acceptable and justified fiscal resource sharing formula. Hence, the President General Pervaiz Musharraf amended the "Distribution of Revenues and Grants-in-Aid Order, 1997" by issuing Ordinance No. 1 of 2006. Thus finally after a delay of six years, the resource distribution mechanism of 1997 was amended on 1st July, 2006 [Pakistan (2006a)]. Considering the provinces demands, the provincial share was increased against the federal and they were given gradual increase in their shares.

In Short, History of NFC indicates that the resource distribution in Pakistan by and large has been unsuccessful. It has both the shades of failure as well as certain achievements. On its positive achievements, NFC has a best system to ensure amicable resource distribution as it takes all the decision makers on board and decides over resource distribution with their consent. In addition, with the passage of time more financial autonomy was delegated to the provinces and there is more realisation of fiscal decentralisation especially in past two NFC awards of 1997 and 2006. Onwards from 1991 NFC award, resource allocation for the provinces increased either due to inclusion of taxes in the DP or due to the higher provincial share against that of federal. In addition, increased grants and straight transfers are channelised to the provinces now. Similarly, the incentive of matching grants motivated the provinces, inviting them to enhance efficiency, have their own resource generation and obtain financial autonomy [Ahmed, *et al*. (2007)].

However, on its negative side, NFC has experienced various deadlocks too, mainly due to the non agreement among the provinces. In a political economy like Pakistan, all the provinces have differing characteristics and offers different economic opportunities to

[3]Provided that they exceed the target of 14.2 percent growth in revenue generation.

its people. Varying interests of the provinces weakened their bargaining power. Over the time, provinces have demanded for inclusion of different criteria in the resource distribution formula. For example, Sindh has emphasised on the revenue generation criteria, Khyber Pakhtunkhwa demanded for backwardness, Balochistan advocated for area while Punjab insisted for taking the agriculture produce as a criteria to be considered while distributing the resources. Thus due to the failure in bargain and absence of consensus, provinces retreat to the adoption of a single criterion, which is sub optimal. The institutional set up of NFC has failed in amicably progressing and tackling the problem of fiscal decentralisation. Lack of consensus had given way to interim awards and grants which ultimately has benefited the larger province.

ECONOMETRIC ESTIMATION

Methodology

For this study, the theoretical model of Davoodi and Zou (1998) is followed. It is the most explicit and well elaborated model encompassing the influence of fiscal decentralisation upon economic growth. Authors have extended the endogenous growth model of Barro (1990) which states that production function has two inputs i.e. capital and public spending. Keeping in view the Pakistan's situation,[4] it is assumed that over the time, public spending is done by the two tiers of government i.e., federal and provincial. Thus, appropriation of spending among the different levels of government can lead to higher economic growth (even without changing the existing budget's share in GDP) if the prevailing spending pattern is different from the growth maximising expenditure shares.

In the context of this study, we will follow the above model to determine the effects of FD on economic growth and final regression equation can be written as:

$$\Delta PCGDP_t = \alpha_0 + \alpha_1 FD_t + \alpha_2 D_t + \alpha_2 Control_t + \varepsilon_t$$

where '*t*' refers to time, $\Delta PCGDP_t$ represents the growth rate of per capita gross domestic product. FD_t is the set of proxies that would represent different aspects of decentralisation. Different FD variables would be separately used in the regression as alternative measures of fiscal decentralisation. D_t is the dummy variable representing years with political instability. There were certain events that presumably affected the economic outcomes in Pakistan and by introducing the dummy for politically volatile years we want to control their effects. Lastly, as we know that literature has identified a number of important variables that affect economic outcome of the country and are therefore included in the regression. Hence, $Control_t$ variables including investment, government expenditures and trade openness are taken into account to get reliable results.[5]

Data

As discussed earlier, the major focus of the study is to test the empirical relationship between fiscal decentralisation and economic growth for Pakistan. For this purpose, study

[4]Even after LGO, 2001, ninety six percent of public spending is carried out by the two tiers of government which are federal and provincial.

[5]We tried but could not get significant results for labour force variable therefore is not discussed here.

would use time series data for 36 years covering the period from year 1974-2009. Although, the length of the data is quite narrow for the time series analysis, nevertheless, there are solid reasons which restrict the availability of meaningful data for this study. To explain a bit, in 1973 a new constitution was promulgated in Pakistan which explicitly elaborated the resource distribution mechanism in the country and following that data is available in legible form. Another reason is that prior to year 1973, Pakistan was struggling to recover from; adverse economic conditions due to the 1971 war, the end of eleven years of dictatorship and the separation of East Pakistan. Therefore, to have data for relative normal years, this study is restricted to start with data from year 1974 onwards.

Now the important variables for the analysis are discussed. Before going into details, it is important to explain that as in this study we will be dealing with different important economic variables which might be a function of economic growth hence, to avoid the endogeneity issue we will express the explanatory variables as ratio to GDP. As we have GDP growth variable on the left hand side of the equation while the variable on the right hand side are expressed relative to level GDP thus explanatory variables are assumed to be exogenous. Per capita GDP growth (ΔPCGDP) is used as the dependent variables to measure economic performance. PCGDP (at constant local currency unit) and has been taken from the World Bank's World Development Indicators (WDI).

For the right hand side control variables, investment holds the most important position and is considered crucial for economic growth. This study uses 'Total Investment' figures to capture investment behaviour in Pakistan and data is collected from various sources including SBP (2005), Pakistan (2009) and Budget speech 2009-10. In order to make it more intelligible and easy for explaining its relative position, Total Investment was expressed as a ratio to GDP (invtgdp).

Government expenditure is considered as another important contributor to economic growth in developing countries. Developing countries often face problem of concentration of power at the centre and therefore, bulk of resources pours into the economy in the shape of government spending. Thus, government expenditure[6] was used and expressed as ratio to GDP (getgdp). Data source for this variable was WDI. Another important contributor to economic growth in this globalised world is trade openness. Measure for trade openness is defined as 'exports plus imports' of goods & services and is expressed as a ratio to GDP (open). Hence, this variable would reflect the impact of trade openness on economic growth. Data for these variables was also taken from WDI.

Fiscal Decentralisation Measures

Having discussed the important determinants of economic growth, now we are in a position to discuss proxies for the variable of interest i.e. fiscal decentralisation. Data source for this variable was SBP (2005) and *Pakistan Economic Survey* (Various Issues) Decentralisation is a complex phenomenon and it covers a range of issues, from revenue raising capability, to the administrative capacity of the sub-national governments to take decisions as well as their spending responsibilities. Hence, it is very difficult to

[6]General government final consumption expenditure includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditure on national defence and security, but excludes government military expenditures that are part of government capital formation (WDI definition).

efficiently measure the exact degree of decentralisation. Nevertheless, literature on fiscal decentralisation has proposed a number of alternative measures which can be used to proxy the level of fiscal decentralisation in a country.

Revenue approach for measuring fiscal decentralisation was used in this study. This approach was adopted in order to isolate the effects of two major sources of revenues for the provincial governments in Pakistan. These sources are the provincial own revenues and federal transfers (i.e. the provincial share in federal resource pool). Thus, analysis would make us able to figure out the individual effects of provincial resource generation potential and the effects of vertical fiscal imbalance (which illustrates provincial dependence on federal transfers) on economic growth.

To capture the above stated aspects of fiscal decentralisation, proxies were tried in a number of ways so as to get a better measure for fiscal decentralisation. Due to the significant nature of the federal transfer in the provincial revenues, we will start discussing it first. Total federal transfers to provinces is presented in three different ways including real federal transfer[7] (rftrans), as a ratio to provincial total revenues (ftransttpr) and as a ratio to GDP (ftranstgdp). Thus, vertical fiscal imbalance captured in such a manner would provide us a chance to confirm its overall significance on economic growth of Pakistan by expressing it in absolute as well as in relative terms.

Another important proxy to capture fiscal decentralisation is by looking at the provincial own revenues. The impact of provincial own resource base is used in a number of ways to enquire its contribution to economic growth of Pakistan. Presenting the total provincial revenues generated from own sources would be meaningless owing to its magnitude, therefore, provincial tax revenues are presented in ratio to federal tax revenues (ptaxtftaxr). This measure would show the impact of any increase in provincial tax revenues relative to federal and would help in enquiring its long run affect on the economic growth of Pakistan.

Unit Root Test for Stationarity

The augmented Dickey-Fuller (ADF) test is undertaken for all the variables using up to two lags[8] for each variable. The ADF test contains the short run dynamics and is based on the autoregressive models that contains the lagged differences of the same variable with the optional inclusion of both 'constant' and 'constant and trend' factors. Here the null hypothesis is that "the variable contains a unit root i.e. it follows a non-stationary process i.e. H_0: $\beta-1 = 0$" which is tested against an alternative hypothesis that "variable is stationary i.e. H_1: $\beta-1 < 0$". Hence, if the calculated value of the AFD test statistic is lower than the critical values, we accept the null hypothesis that there is a unit root and vice versa. The ADF results for the set of variables used in this study are presented in Tables 3 and 4. It can be observed from the results that all variables (except three i.e. ratio of investment to GDP, ratio of government expenditure to GDP and ratio of provincial tax to federal tax revenues; which are stationary at level hence I(0)), are first difference stationary or I(1). Results remains consistent both with the inclusion of a 'constant' and a 'constant and trend' factors in the ADF. Hence, it can be concluded from the results of the ADF test that data contains variables that are mix with respect to their order of integration. Therefore, the selection of appropriate econometric technique should be undertaken considering this property of the data.

[7]Deflated using GDP deflator.

[8]To allow for the correction of serial correlation, if any.

Table 3

H_0 : Non Stationary (At Level)

	τ – ADF with Constant			τ – ADF with Constant and Trend		
	Lags			Lags		
Variables[9]	0	1	2	0	1	2
Pcgdp	1.445	1.600	1.714	1.065	1.498	1.879
Invtgdp	3.723***	2.572	2.506	3.508*	2.725	2.704
Open	2.492	2.482	2.268	2.640	2.608	2.293
Getgdp	2.954*	1.201	1.565	2.907	1.095	1.418
Ptaxtftaxr	3.014**	4.746***	5.128***	2.537	4.180**	4.654***
Ftranstgdp	1.535	1.627	1.800	1.717	1.879	1.953
Rftrans	1.372	1.376	1.526	1.464	1.725	1.804
Ftransttpr	1.899	2.005	1.788	2.151	2.684	2.545
Critical Values	3.633	3.639	3.646	4.243	4.253	4.262
1%=***, 5%=**,	2.948	2.951	2.954	3.544	3.548	3.553
10%=*	2.612	2.614	2.616	3.205	3.207	3.209

Table 4

H0: Non-stationary (At 1st Difference)

	τ – ADF with Constant		
	Lags		
Variables	0	1	2
Dpcgdp	4.442***	2.747*	2.512
Dinvtgdp	5.639***	4.166***	4.806***
Dopen	6.085***	4.976***	4.295***
Dgetgdp	10.52***	3.900***	2.890*
Dptaxtftaxr	5.081***	3.782***	3.620**
Dftranstgdp	5.212***	3.777***	2.571
Drftrans	4.776***	3.576***	2.391
Dftransttpr	4.657***	3.912***	2.823*
Critical Values	3.633	3.639	3.646
1%=***,	2.948	2.951	2.954
5%=**, 10%=*	2.612	2.614	2.616

Econometric Technique

There are number of econometric techniques which can be used to measure the relationship between economic variables. Adoption of different alternative techniques depends on the nature of data and the kind of relationship in which researchers are interested. In case of Pakistan, as National Finance Commission decides the resource transfer mechanism between federal and provincial governments by announcing NFC awards. These awards are constitutionally required to be announced after every five years (although some inconsistency is being faced from time to time). Therefore, it would be interesting to find out both the short term as well as the long run effects of fiscal

[9]Variables expressed in lower case presents their log transformation.

decentralisation in Pakistan. This analysis will present the net effect of government's stance over fiscal federalism for its effect on economic growth. The appropriate econometric technique for estimating such kind of a relationship can rightly be pointed out as the "Cointegration technique".

To estimate cointegrating long run relationship among the variables, several methods are in practice and data properties often dictate their selection. Available techniques include the single equation residual based Engle and Granger (1987) technique, the maximum likelihood approach of Vector Autoregressive (VAR) by Johansen (1988, 1991, 1995), Johansen and Juselius (1990), the semi parametric approach by Phillips (1991) and quite recently, the ARDL approach is catching attention. Pesaran (1997), Pesaran and Shin (1995) and Banerjee, *et al.* (1986, 1993, 1996) presented the Autoregressive Distributed Lag (ARDL) model where the short run and long run coefficient estimates are presented in an ARDL specification. The most noticeable improvement in the ARDL single equation approach is that it is the only cointegration technique that allows for the inclusion of I(0) and I(1) variables in the single equation estimation. ARDL cointegration technique yields comparatively better results in small sample.

In our case, we have a small sample of 36 annual observations and data set contain variables that are integrated of different orders i.e. I(1) and I(0) thus, we will use the ARDL approach following Banerjee, *et al*. (1986, 1993). Describing the advantages of ARDL models that it encompass all the nested models, authors used the Error Correction Mechanism (ECM) set up to suggest a test for cointegration. The test uses the lagged dependent variable as the error correction term to represent the existence of long run relationship. The unrestricted dynamic model presented by Banerjee, *et al.* can be written as:

$$\Delta y_t = \alpha \Delta x_t + \beta y_{t-1} + \theta x_{t-1} + \in_t$$

Where y_t is the dependent variable while x_t is the set of independent variables. In the above equation "α" represents the short run effects of changes in *X* on *Y*, while "θ" are used to present long run coefficients for set of independent variables. Lastly, the coefficient of lagged dependent variable i.e., "β" indicates the error correction term and shows that with each passing period how much of the disequilibrium is adjusted. "β" can also be explained as the rate at which model achieves equilibrium in the long run. The value of the error correction term lies between zero and two, where depending on significance 'zero' means no long run relationship among the variables while value of 'one' suggest that disequilibrium is adjusted in the same period. However, any value between 'one' and 'two' would be exhibiting explosive roots.

Table 5 present the results obtained by the General-to-specific (Gets) model selection procedure [Krolzig and Hendry (2001)]. According to Gets, analysis should start with the full model, then removing the insignificant variables and consulting the diagnostic checks till the final specification is reached where all the variables are significant. Gets approach in our case would benefit the analysis by eliminating the insignificant variables thus providing better degree of freedom for the rest of the variables to be estimated. Thus, applying the Gets approach to the ECM for the model discussed above has produced results as reported in Table 5. All the diagnostic tests are satisfied thus we can rely on the results that are produced.

Table 5

Results

Dependent Variable for the All the Models is "DPCGDP"			
Independent Variables	Model 1	Model 2	Model 3
Constant	2.221***	2.069***	2.931***
D.invtgdp	0.129**	0.121**	0.105**
D.getgdp	–0.043*	–0.038*	
D.openbop	–0.074*	–0.071**	
D.ptaxtftaxr	0.049*	0.046**	
D.ftranstgdp	0.056**		
D.rftrans		0.060***	
D.ftransttpr			0.041*
L.pcgdp	–0.268***	–0.251***	–0.347***
L.invtgdp	0.163***	0.152***	0.119***
L.openbop			0.085**
L.ptaxtftaxr	–0.035**	–0.034**	–0.054***
L.ftransttpr			–0.027*
dnps	–0.013*	–0.013**	–0.013*
Trend	0.005*	0.001***	0.007***
N	35	35	35
p	11	11	10
R-sq	0.68465	0.71625	0.67997
Radj^2	0.55326	0.59803	0.56476
Chow(2006:1)	0.3101	0.2770	0.6565
F(4, 24)	(0.8678)	(0.8894)	(0.6289)
Normality Test	3.8020	4.1224	2.6036
chi^2(2)	(0.1494)	(0.1273)	(0.2720)
AR 1–4 Test	0.6714	0.6435	1.2651
F (4, 24)	(0.6195)	(0.6378)	(0.3149)
ARCH 1–4 Test	0.1777	0.1892	0.7977
F (4, 24)	(0.9479)	(0.9420)	(0.5372)
Hetero Test	24.1197	25.6131	
Chi^2(12)	(0.1916)	(0.1413)	

Legend: * p<0.05; ** p<0.01; *** p<0.001, For Diagnostic tests, p-values in parenthesis.
Results obtain using PcGets, by DF Hendry and H-M Krolzig, 1998-2005, version 1.18b.

Results Interpretation

Analysis has produced interesting results and it has proved the existence of long run relationship among the given set of variables. Results are interesting in the sense that they separate the short run effects from the long run influences of the variables. Three models, using different proxies for FD are presented here. Although, results are complicated but in line with facts related to the economy of Pakistan and is a true representation of the period under the analysis. The most important point to emphasis is that there exist a long run relationship between the fiscal decentralisation and economic

growth and it has pointed out the weaknesses of the FD mechanism in Pakistan. FD has long run contribution to the economic growth of Pakistan but it needs certain corrections for consistently positive results. The error correction term obtained from the lagged dependent variable has a significant coefficient ranging between 25–35 percent for different models. This shows that if there is any disequilibrium, one fourth of it would be adjusted with each passing year although the specific speed of adjustment depends on the variables under consideration in different models.

First looking at the variable of interest, the ratio of 'provincial tax revenue to federal tax revenue' has an interesting implication in the model. During the short run (where variables are expressed in differenced form), the 'provincial tax to federal tax revenues' ratio has lead to a positive impact on the economic growth. Similarly the other indicator of provincial revenues representing FD i.e., 'federal transfer to GDP', 'real federal transfers' and 'federal transfers as ratio to total provincial revenue' has also the same short run positive impact. Thus proxies of FD have produced almost the same results by posting a positive sign for coefficients in the short run.

Short run analysis indicate that if there is an increase in provincial tax revenues with respect to federal tax revenues, it's immediate effect on the economy would be positive. Same is true for federal transfers which indicates that if provinces receive more funds to spend at local levels, it will positively affect economic growth in the short run.

However, despite the fact that we got positive and significant short run results for FD variables but in the long run, the accumulated effect of FD overtime has negative implications for the economic growth of Pakistan. Long run relationship (denoted by lagged levels of variables) exhibit that only two proxies i.e., ratio of 'provincial to federal tax revenue' and ratio of 'federal transfers to total provincial revenue' have produced long run significant effects. Thus, factors that were measured with respect to provincial finances have turned significant in the long run. Nevertheless, both the proxies of FD have produced negative coefficients for the long run.

These results are somewhat contradictory but one can think that they are in line with the economic situation in Pakistan. Provinces had negligible taxation powers which means that they always remained under-capacitated with respect to tax collection experience and at the same time they remained dependent on federal finances to fulfil their obligations. In these conditions if provinces are given higher taxation powers relative to federal government, this will incur efficiency losses because federal government is always considered more efficient in tax collection as compared to lower tiers of government. Higher taxation powers at the cost of federal government collections will result in long run losses to the economy and thus produced negative long run coefficient for 'ptaxtftaxr' variable.

On the other hand, although any increase in federal transfers to provinces will help provinces with more funds availability but these funds might have certain strings attached to it for its consumption. Federal transfers increases provincial finances but these does not necessarily goes to the sector prioritised according to local needs rather they might be spent to achieve overall national goals set by federal government. Hence, if increased spending is not in accordance with local needs, it cannot achieve the results that are expected from fiscal decentralisation. Excess dependence on federal transfers might undermine provincial autonomy which will

have negative effects according to the theories of FD. Federal transfers merely represent transfer payments to the provincial governments as they are already collected by the federal government therefore it will have no effect on the economic efficiency of the provinces. In Pakistan, as these transfers are being decided only on the basis of population only thus it fails to enhance the provincial capacity. Moreover, increased federal transfers may also result in higher consumption spending which will have positive impact on the economy in the short run but does not have same long run implications for the economic growth. Lastly, Positive effects from increased federal transfers to provinces in short run is out-balanced by the negative implications of reduction in federal revenues because an increase in federal transfers is a drain on federal government resources. Less resources at federal level retards long run economic growth. Pakistan has the lowest tax to GDP ratio (currently at 9 percent, while it hovered around 11 percent on average throughout the period of analysis in this study) and thus further reduction in federal resources will put constraints to finance mega projects that are necessary for long term economic growth.

In addition, when the provincial government has more tax revenue in comparison with the federal government, it negatively affected economic growth. This indicates that provinces were inefficient in the realisation of efficiency gains from the revenue decentralisation due to their capacity issues. Thus in the long run, negative efficiency losses has dominated the positive welfare gains due to higher taxation powers of the local governments. On the other side, the fact remains that federal government had delegated only those taxes to the provinces which were not buoyant so it required more effort thus failed to have a long run positive effect on the economic growth in case of Pakistan.

Thus, one can say that provinces were not better positioned to take advantage of increase in finances. This reflects that provinces do not possess such a decentralised system which can make them more responsible, innovative and productive. Lastly, the inconsistencies occurred with respect to FD in the country might also be responsible for the negative relationship. Thus, it is concluded that the FD mechanism adopted in Pakistan during the period has failed to produce optimum results. Poor provincial capacity to efficiently generate own resources as well as provincial dependence on federal transfers has negatively affected the long run economic growth of Pakistan. Thus, the uni-criterion resource distribution mechanism has fails to affect economic growth of Pakistan positively in the long run.

For the other explanatory variables, investment has a positive impact both in the short run and long run in all the models. On the other hand, two other variables i.e., 'government expenditures at the national level' and 'trade openness' have produced negative effects on the economic growth of Pakistan in the short run. As the government consumption spending includes the spending on defence and security for maintaining law and order, therefore instability in the country has often resulted in huge spending. This increased spending coupled with the political instability (which also has a negative coefficient, as expected) has produced the negative short term effects. 'Trade openness' although has negative sign in the short run due to persistent huge trade deficits, it ultimately posted a positive impact in the long run when it becomes significant in the 3rd model.

CONCLUSION AND RECOMMENDATIONS

This study mainly discussed the fiscal resource distribution mechanism of Pakistan. Main objective of the study was to get acquainted with the fiscal decentralisation stance of Pakistan and its impact on economic growth of the country over the long run. In this connection, all the important concepts and systems that took place in Pakistan, were discussed at the start.

The issue of resource distribution among federal and provincial governments never proved to be simple and is always considered a much complex issue. This study identified several issues in fiscal resource distribution mechanism of Pakistan. The most important issue was that the National Finance Commission adopts a single criterion (population) for resource redistribution among the constituent parts. There is a need to consider, evaluate and choose among a range of other indicators of development and fiscal needs. Among the important variables; infrastructure, poverty, backwardness, revenue generation capacity, efficiency aspects, inverse population density and likewise should be reviewed and most appropriate of these should be taken into account for solving the economic discrepancies of provinces through adequate resource transfer.

A best working federal transfer system should take both the competitive as well as cooperative aspect of federalism. Although, these aspects are somewhat contrary to one another but to ensure balanced growth and considering welfare of the people, a balance should be brought between the two sides of federalism. A transfer system should be such that it can enhance economic efficiency and productivity through incentives as well as competition. Competitive federalism would take provinces towards innovation in revenue generation and better service provision through the increased competition among the federating units. Thus competitive federalism would induce higher economic growth that result from increased efficiency and would also help in achieving better governance.

To sum up, key to successful public service delivery is adequacy, sufficiency, transparency and regular flow of funds to the stake holders. There should be an integration of other resource distributions tied to the development unit and all channels of resource flow to the provinces should be identified. Thus a bottom up approach is required which include all levels of formula, straight transfers and non-formula adhoc transfers. This should be accompanied with clearly identified aims and objectives of the financing and service delivery assignments; this will lead to an optimal level of growth and equity. Government had tried the devolution of power to local governments, which if accompanied with an adequate financial devolution would result in maximum economic returns.

There should be more provincial autonomy and national cohesion that would result in better understanding of the needs of the federating units keeping the regional affiliation at the side. Financial autonomy will give more resources, more confidence and would also make the federating unit more accountable. Decentralised set up will reduce the dependence of the provinces on the centre and centre would be allowed to concentrate more on the national issues and only engage in the collection of those resources which can improve efficiency gains at the federal level. Thus the economic loss due to absence of capacity building mechanism in the provinces as well as engagement of the centre in the provincial matters would be resolved. Provinces should be encouraged and incentivised to generate their own resources instead of being dependent on federal government.

In the light of the given discussion, following recommendations can be suggested which would enhance the performance of the federation and result in higher economic growth:

(1) Administrative decentralisation should be accompanied with the adequate fiscal decentralisation and capacitating the provinces with the delegation of appropriate financial autonomy.
(2) Specialised and independent institutions should be developed to ensure smooth and judicious Intergovernmental resource distribution.
(3) There should be a permanent body of NFC with a specialised secretariat and professionals of the subject as consultants.
(4) The criteria used for addressing horizontal resource distribution should be broadened by incorporating criteria which can ensures efficiency.
(5) Data availability and its quality should be improved to ensure better assessment of sub-national revenue potentials as well as to enhance transparency in resource flow.

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The Relative City Price Convergence in Pakistan: Empirical Evidence from Spatial GLS

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I. INTRODUCTION

It is evident from general experience that price of same good may differ considerably among countries, regions, cities in same country and even adjacent shopping malls and outlets. It is also common knowledge that stronger competitive forces and information about market price tend to ensure convergence of prices. In the presence of these forces price differentials cannot be persistent and are hence short lived.

The recent literature on price convergence has focused on country studies using regional commodity prices and Consumer Price Index (CPI) data.[1] The analysis of relative prices or real exchange rates between regions or cities in a country has certain advantages in estimating Purchasing Power Parity (PPP) puzzle. There are no trade barriers and non tradable goods in a single country. Krugman and Obstfeld (2007) consider transportation costs, trade barriers and goods market segmentations as obstacles to hold international PPP. Furthermore they mention that countries have different endowments, baskets of goods and consumption weights in their inflation index. So PPP may not hold even if there are no non tradable goods and barriers. The PPP theory is related to the law of one price through arbitrage of international goods. The estimation of real exchange rates among countries shows that the convergence towards PPP is very slow.[2] This study attempts to use overall Consumer Price Index (CPI) data on 35 Pakistani cities from July 2001 to June 2008 to estimate relative city price convergence with Karachi and Lahore, two numeraire cities. The case of Pakistan is interesting primarily due to the following reasons.

First interesting aspect is the geographical location and diversified regions in Pakistan. Pakistan is in South Asian region consists of five provinces i.e. Punjab, Sindh, Balochistan, Khyber Pakhtunkhwa (KP) and Gilgit Baltistan (GB). Each province has its own regional language and ethnicity but they communicate in national language with each other. Furthermore, each province shares some international border e.g., Punjab and Sindh with India, KP with Afghanistan, Balochistan with Iran and Afghanistan and Gilgit-Baltistan with China.[3]

Second, there is also evidence of illegal trade on these borders.[4]

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[1]Cecchetti, *et al.* (2002), Morshed (2005), Chmelarova and Nath (2010), Lan and Sylwester (2010).

[2]"Consensus estimates suggest, however, that the speed of convergence to PPP is extremely slow" Rogoff (1996).

[3]The data on inflation in GB province is not reported in Inflation Monitor of SBP, so not included in my study.

[4]Sharif, *et al*. (2000) mentioned smuggled commodities and identified major routes of smuggling on Pakistan-Iran and Pakistan-Afghanistan borders.

Similarly there are also reports of illegal trade on the eastern borders with India with its worth ranging $0.5 to $3 billion.[5] There is a possibility that price levels in bordering cities do not converge with the two major cities in Pakistan in the presence of illegal trade in the presence of cheap smuggled goods.[6]

Third, there is evidence that some cities have persistently higher inflation than others. The State Bank of Pakistan's (SBP's) Inflation Monitor January 2010 states that 19 cities recorded higher than over all Year on Year (YOY) inflation in January 2010. The 16 cities recorded lower than average inflation.

The Table 1 ranks cities with higher or lower than average inflation based on Inflation Monitor of SBP various issues. Five cities in Punjab named Mianwali, Jhang,

Table 1

Persistence of Inflation in Pakistani Cities

Times> Average	Cities	2005	2006	2007	2008	2009	2010
5	Mianwali	Yes	Yes	Yes	Yes	No	Yes
4	Faisalabad	Yes	Yes	No	Yes	No	Yes
2	Sialkot	No	Yes	No	No	No	Yes
4	D.G.Khan	No	Yes	Yes	Yes	No	Yes
4	Bahawalpur	Yes	Yes	Yes	No	No	Yes
5	Vehari	Yes	Yes	Yes	Yes	No	Yes
5	Jhang	Yes	Yes	Yes	Yes	No	Yes
4	Sargodha	Yes	Yes	Yes	No	No	Yes
4	Loralai	Yes	Yes	No	Yes	Yes	No
5	Gujranwala	Yes	Yes	Yes	Yes	No	Yes
3	Attock	Yes	Yes	Yes	No	No	No
3	Peshawar	No	Yes	No	Yes	Yes	No
5	Okara	Yes	Yes	Yes	No	Yes	Yes
4	Bahawalnagar	No	Yes	Yes	Yes	No	Yes
4	Bannu	No	No	Yes	Yes	Yes	Yes
3	Rawalpindi	Yes	Yes	Yes	No	No	No
4	Nawab Shah	No	No	Yes	Yes	Yes	Yes
4	Mirpur Khas	No	No	Yes	Yes	Yes	Yes
4	Shahdadpur	No	No	Yes	Yes	Yes	Yes
3	Turbat	Yes	Yes	No	Yes	No	No
3	Lahore	Yes	Yes	No	No	No	No
3	Kunri	No	No	No	Yes	Yes	Yes
3	Larkana	No	No	Yes	Yes	Yes	No
2	Hyderabad	No	No	No	Yes	Yes	No
2	Sukkur	No	No	No	Yes	Yes	No
2	Quetta	No	No	No	Yes	Yes	No
2	Karachi	No	No	Yes	No	Yes	No
3	D.I.Khan	Yes	No	No	Yes	Yes	No
4	Khuzdar	Yes	No	Yes	Yes	Yes	No
3	Samundari	No	No	Yes	Yes	No	Yes
3	Abbottabad	No	No	No	Yes	Yes	Yes
3	Mardan	Yes	No	No	Yes	Yes	No
3	Multan	No	No	Yes	Yes	No	Yes
3	Jhelum	Yes	Yes	Yes	No	No	No
3	Islamabad	Yes	Yes	Yes	No	No	No

Note: Yes means inflation in current year is higher and no means lower than national average.

[5] For details see Khan (2005) Can Illegal Trade between Pakistan and India be Eliminated? SDPI.

[6] The estimation of border effects is not the scope of this study due to data limitations.

Okara, Vehari and Gujranwala showed more than average inflation in 5 years out of 6 years 2005-2010. There are 11 cities in which the inflation has recorded 4 out of 6 years higher than average inflation in Pakistan. These cities include Faisalabad, Sargodha, Dera Ghazi Khan, Loralai, Khuzdar, Bahawalpur, Bahawalnagar, Bannu, Nawabshah, Mirpurkhas and Shadadpur. The persistence of more than average inflation seems to higher in Punjab province since 7 out of 11 high inflation cities are located in Punjab province.

A high and persistent variability of regional inflation with in a country has adverse effects on the standard of living.[7] It can cause internal regional migration due to persistent lower real wage.

The study intends to find speed of convergence by estimating half life of price shock. Since the idea is to estimate relative price convergence, the numeraire cities are chosen to be Karachi and Lahore. They have highest population and they are urban commercial centers. Lahore is capital of province Punjab and can be considered as a central market for agricultural produce.[8] Karachi is capital of province Sindh and center of industrial and economic activity. The highest proportion of income tax is collected from Karachi.[9]

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II. LITERATURE REVIEW

The consensus estimates of Rogoff (1996) suggest 3–5 years duration of price convergence which is very slow. He considered difference of tastes and technology the main reason for slow prices adjustment. He did cross country analysis where the difference of tastes and technology may be wider. After Rogoff (1996), the literature emerged using country level regional data where the tastes, habits and technology may not differ considerably.

Parsely and Wei (1996) used panel of 51 prices from 45 USA cities and found higher convergence. They indicated a serious bias in estimates induced by i.i.d Measurement error in data and corrected for this bias in their study. They also found higher convergence if difference is higher but slower convergence for cities located farther apart.

Cecchetti, *et al*. (2002) found evidence of relative city price in USA but the convergence rate was found to be very sluggish, 9 years. The slow convergence for a single economy case is surprising. But the slow convergence as found by Cecchetti, *et al*. (2002) in the case of American cities is further puzzling since it is usually believed that trade barriers with in a country may be less than that of international borders.

Morshed, *et al*. (2005) found half of price shock in the case of 25 Indian cities as low as only three months and found strong evidence of relative price convergence for India.

Imbs, *et al*. (2005) in their seminal paper showed importance of dynamic aggregation bias in estimating PPP. They found higher rate of convergence among real exchange rates when heterogeneity is taken in to account. The main argument is that all

[7] Das and Bhattacharya (2008).
[8] Zahid, *et al*. (2007).
[9] Federal Bureau of Revenue (FBR) Year Book 2009.

the goods which are part of CPI do not converge at the same speed. They estimated half life to be less than a year, 11 months.

Das and Bhattacharya (2008) used monthly data on Indian regions from January 1995 to June 2004 and estimated price convergence across Indian regions using panel unit root tests robust to cross sectional dependence. They found that relative price levels are mean reverting in Indian regions. The estimated lowest half life is estimated to 6.7 months for Kerala and as highest as 25.80 months for Uttar Pradesh. The all states half life is 18.85 months and all centers is 19.83 months.

Sonara Robert (2009) addressed the issue of structural breaks using city price data from USA over the period 1918–1997. He used Zivot and Andrew (1992) and Perron-Vogesang (1992) unit roots tests with structural breaks and found relative prices to be stationary. The structural breaks are found significant and convergence rates found to be lower than panel unit root tests.

Chmelarova and Nath (2010) used annual CPI data of 17 USA cities from 1917-2007 and constructed relative city price panels with each city as numeraire. They used Cross Sectional Augmented Dickey Fuller Test [Pasaran (2007)] and found that choice of numeraire city matters for relative city price convergence analysis. They also adjusted the estimates for bias and found a smaller half life of a price shock. But the speed of convergence is estimated to be low. They decomposed the relative price series in to common factor and idiosyncratic factor. The lack of convergence in six cities is due to non stationarity of common factor.

Lan and Sylwester (2010) used commodity price data from 36 cities in China to examine rate of convergence following idiosyncratic shock. The study used fixed effect model for individual goods panels and mean group method for all goods. They found evidence of convergence at faster rates and estimated half life few months, smaller than other studies.

Fan and Wei (2006) used 7 years monthly CPI data of 36 Chinese cities and applied panel unit root tests to find price convergence. They found that price levels across Chinese cities are mean reverting and duration of half life of price shock is as low as 3-4 months. They consider the use of high frequency time series data in finding fast rate of convergence as suggested by Taylor (2001).

III. METHODOLOGY AND DATA

This study attempts to use monthly Consumer Price Index (CPI) data of 35 Pakistani cities from July 2001 to June 2008. The data has been compiled from Monthly Bulletin of Statistics various issues by Federal Bureau of Statistics. The study intends to use Ordinary Least Squares (OLS) city by city 34 equations. Furthermore in the presence of spatial dependence among cross section units it is also useful to use Spatial Generalised Least Square (GLS) method and compare the results with OLS. The significant difference in results may emphasise the importance of spatial correlations. The relative city prices or exchange rates have been calculated as following:

$$RP_{it} = \frac{P_{it}}{P_{bt}} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

i=1 …N cities and t=1 ….T time periods or months; b =1, 2 the base or numeraire cities

In log form Equation 1 can be written as

$$rp_{it} = p_{it} - p_{bt} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

The objective is to estimate model with varying intercept and cross section slope dummies as an AR (1) process to check the stationarity of relative price series:

$$rp_{it} = \alpha_i + \rho_i rp_{it-1} + \varepsilon_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

The relative price is converging if individual cross section $\hat{\rho} < 1$ where rho is autoregressive coefficient. The following hypothesis will be tested:

$$H_o : \hat{\rho}_i = 1$$
$$H_a : \hat{\rho}_i < 1$$

The OLS assumes that error term is homoskedastic and not serially correlated that is $E\left[\frac{\varepsilon}{X}\right] = 0$ and $E\left[\varepsilon\frac{\varepsilon'}{X} = \sigma^2 I\right]$. The OLS estimator is best linear unbiased, consistent and asymptotically normally distributed.[10] However if the variance covariance matrix from Equation 3 is not homoskedastic, the least squares estimator is still unbiased and consistent. But the sample variance is biased estimator of σ^2 when disturbances are hetroskedastic. "When the covariance matrix of the disturbance vector is not scalar, multiple of identity matrix, it is well known that GLS estimator provides best linear unbiased estimator in contrast to OLS. [11]

In this case $\varepsilon \sim N(0, V_\varepsilon)$; the estimation of GLS requires weighting of variables and the weights can be taken from the variance covariance matrix of estimated residuals from Equation 3.

$$V_\varepsilon^{-\frac{1}{2}} rp_{it} = V_\varepsilon^{-\frac{1}{2}} \alpha_i + \rho_i V_\varepsilon^{-\frac{1}{2}} rp_{it,-1} + \mu_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

After the transformation of Equation 4, it can be written as

$$rp_{it}^* = \alpha_i^* + \rho_i^* rp_{i,t-1}^* + \mu_{it}^* \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

Here $\mu_{it}^* \sim N(o, I)$

The autoregressive coefficient, *rho* in Equation 5 can be considered as the spatial autoregressive coefficient since the covariance matrix from OLS Equations contains spatial spatial correlations. The Equation 5 can be estimated by OLS.

The other objective is to estimate half life of a price shock. The convergence of price shock may be slow or fast depending upon the half life of a price shock. The study uses following formula to estimate half life of price shock;

$$H(\rho) = \frac{\log(0.5)}{\log(\hat{\rho})} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

[10] For details see Greene's text book.

[11] Gotu Butte (2001).

My study applies OLS and GLS both the techniques and provides estimates for comparison.

IV. DISCUSSION OF EMPIRICAL FINDINGS

The relative city prices convergence with numeraire city Karachi are reported in Table 2. The rho coefficient based on the average of 34 cities is 0.88 with OLS. The half life has been estimated to be 5.4 months which is less than 6 months. The individual cities results are different. The highest half life is estimated in the case of Islamabad, the capital territory at 34.3 months. It is almost 3 years. The city of Sialkot showed lowest half life of 1.4 months with Karachi. The other cities who remained below average half life are Faisalabad, Abbotabad, Okara, Lahore, Dera Ghazi Khan, Multan, Sukkur, Shadadpur, Larkana, Kunri and Dera Ismaeel Khan and Bannu. The other 19 cities are above average in terms of half life when the results are estimated with OLS.

Table 2

Relative City Price Convergence with Karachi

No.	Cities	ρi-OLS	Std. Error	H(ρ)-OLS	ρi-GLS	Std. Error	H(ρ)-GLS
1	Abottabad	0.75	0.07	2.41	0.75	0.07	2.41
2	Attock	0.928	0.04	9.28	0.956	0.03	15.40
3	Bahawalnagar	0.946	0.03	12.49	0.94	0.037	11.20
4	Bannu	0.88	0.056	5.42	0.817	0.07	3.43
5	Bahawalpur	0.91	0.04	7.35	0.72	0.07	2.11
6	DGKhan	0.88	0.05	5.42	0.76	0.067	2.53
7	DI khan	0.83	0.059	3.72	0.79	0.065	2.94
8	Faisalbad	0.75	0.07	2.41	0.929	0.04	9.41
9	Gujranwala	0.96	0.03	16.98	0.98	0.039	34.31
10	Hyderabad	0.93	0.04	9.55	0.967	0	20.66
11	Islamabad	0.98	0.02	34.31	0.978	0.02	31.16
12	Jhelum	0.91	0.045	7.35	0.75	0.07	2.41
13	Jhang	0.9	0.048	6.58	0.84	0.059	3.98
14	Mardan	0.97	0.035	22.76	1	0.03	NA
15	Multan	0.88	0.05	5.42	0.908	0.058	7.18
16	Khuzdar	0.92	0.045	8.31	0.827	0.06	3.65
17	kunri	0.87	0.05	4.98	0.87	0.05	4.98
18	Lahore	0.8	0.067	3.11	0.988	0.02	57.41
19	Larkana	0.81	0.058	3.29	0.89	0.038	5.95
20	Loralai	0.96	0.04	16.98	0.97	0.03	22.76
21	MP Khas	0.81	0.066	3.29	0.87	0.055	4.98
22	Mianwali	0.9	0.05	6.58	0.78	0.07	2.79
23	Nawabshah	0.93	0.048	9.55	0.99	0.03	68.97
24	Okara	0.88	0.049	5.42	0.806	0.06	3.21
25	Peshawar	0.9	0.047	6.58	0.74	0.07	2.30
26	Quetta	0.93	0.046	9.55	0.858	0.059	4.53
27	Rawalpindi	0.96	0.029	16.98	0.925	0.04	8.89
28	Shadadpur	0.85	0.066	4.27	0.8	0.068	3.11
29	Sargodha	0.92	0.04	8.31	0.836	0.055	3.87
30	Sukkur	0.82	0.07	3.49	0.82	0.065	3.49
31	Sialkot	0.61	0.086	1.40	0.78	0.07	2.79
32	Samundri	0.94	0.039	11.20	0.829	0.067	3.70
33	Turbat	0.89	0.05	5.95	0.887	0.05	5.78
34	Vehari	0.96	0.028	16.98	0.99	0.01	68.97
	Avg-Pakistan	0.88	0.05	5.42	0.87	0.05	4.98

The average rho coefficient is estimated at 0.87 with GLS less than 0.88 with OLS. The half life is estimated as 4.98 which are also less than 5.4 estimates with OLS. The highest half life is estimated for Nawab Shah and Vehari as 68.97 months. It means that half life is almost 6 years for these two cities. The lowest half life is estimated for city of Bahawalpur as 2.11 months. Some cities have more than average half life of 4.98 months e.g. Attock, Bahawalnagar, Gujranwala, Islamabad, Hyderabad, Multan, Lahore, Larkana, Loralai, Nawabshah, Rawalpindi, Turbat and Vehari. In the case of Mardan, the relative city price does not converge with Karachi. Its rho coefficient is estimated to be unit root and hence not stationary.[12] The distance of Mardan from Karachi is almost 730 miles. Some other cities like Abottabad, and Sialkot have more miles distance from Karachi but relative prices are converging there with Karachi. Similarly Islamabad and Rawalpindi are also more than 700 miles but maybe it's safer to travel there. The cities with equal to and less than 3 months of half life are Sialkot, Shadadpur, Peshawar, Mianlwali, Jhelum, Bahawalpur, Dera Ghazi Khan, Dera Ismaeel Khan, and Abbottabad.

The results on relative city price convergence with Lahore as numeraire or base are reported in Table 3. The average rho coefficient estimated with OLS is 0.89 (half life is 5.94) higher than the rho coefficient with Karachi as numeraire. The lowest half life is 1.8 for Sialkot and the highest is 68.97 for Gujranwala. Interestingly both the cities are close to Lahore relatively. Sialkot is 44.5 miles and Gujranwala is 68.8 miles from Lahore. The GLS results are same for Gujranwala. Other cities showing higher than average half life of shock (5.94 months) are Vehari, Samundri, Sargodha, Rawalpindi, Jhang, Gujranwala, Bahawalnagar, Attock (in Punjab), Sukkur, Nawabshah, Hyderabad, (in Sindh), Bannu, Mardan (in KP Province), Quetta, Loralai (in Balochistan) and Islamabad.

The estimates from GLS show a reduction in rho coefficient. It is estimated at 0.86 and the average half life is 4.8 months, lower than Karachi. The lowest half life is 1.3 months for Mir Pur Khas, almost 556 miles from Lahore. The highest half life is 68.97 months for Gujranwala (44.5 miles), Vehari (172 miles) and Islamabad (175 miles). The other cities where the half life of price shock is more than the average are Attock, Bahawalnagar, Faisalabad, Gujranwala, Hyderabad, Jhelum, Jhang, Larkana, Loralai, Mardan, Nawabshah, Okara, Rawalpindi, Sargodha,, Sukkur, Samundri and Vehari.

The Pakistani cities where half life of price shock in Lahore is almost 3 months or less, are Turbat, Sialkot, Shadadpur, Quetta, Peshawar, Mir pur Khas, Dera Ismaeel Khan, Dera Ghazi Khan, Bahawalpur and Abbotabad.

The overall results show that GLS estimates of average rho and half life estimated to be lower than OLS results. The overall results show that overall prices in individual Pakistani cities converge to the numeraire cities of Lahore and Karachi. The overall half life based on the average of city estimates is less than 6 months with OLS and 5 months with GLS. The individual cities show different results and there is evidence of some heterogeneous behaviour in terms of city price convergence and half life of price shock. The price shock in Lahore dies out more quickly than a shock in Karachi. These estimates are higher than Morshed (2005) in the case of India (3 months) and Lan and Sylwester (2010) China (3 months). But the estimates of present study are less than Imbs et al (2005) and Das and Bhatacharia (2008 who estimated half life at 11 months and 18 months respectively.

[12]Mardan is in KP province and distance wise close to Swat and tribal areas where war against extremists is being fought.

Table 3

Relative City Price Convergence with Lahore

No.	Cities	ρi-OLS	Std. Error	H(ρ)-OLS	ρi-GLS	Std. Error	H(ρ)-GLS
1	Abottababd	0.79	0.067	2.94	0.79	0.067	2.94
2	Attock	0.92	0.04	8.31	0.95	0.03	13.51
3	Bahawalnagar	0.94	0.038	11.20	0.95	0.03	13.51
4	Bannu	0.909	0.05	7.26	0.82	0.07	3.49
5	Bahawalpur	0.89	0.04	5.95	0.76	0.07	2.53
6	DGKhan	0.88	0.05	5.42	0.69	0.08	1.87
7	DI khan	0.82	0.06	3.49	0.78	0.068	2.79
8	Faisalbad	0.86	0.05	4.60	0.89	0.049	5.95
9	Gujranwala	0.99	0.03	68.97	0.99	0.03	68.97
10	Hyderabad	0.94	0.038	11.20	0.96	0.021	16.98
11	Islamabad	0.98	0.02	34.31	0.99	0.016	68.97
12	Jhelum	0.88	0.05	5.42	0.908	0.043	7.18
13	Jhang	0.95	0.04	13.51	0.94	0.045	11.20
14	Karachi	0.8	0.067	3.11	0.84	0.06	3.98
15	Khuzdar	0.88	0.057	5.42	0.82	0.067	3.49
16	kunri	0.85	0.058	4.27	0.85	0.058	4.27
17	Larkana	0.85	0.05	4.27	0.878	0.04	5.33
18	Loralai	0.94	0.05	11.20	0.97	0.036	22.76
19	Mardan	0.96	0.04	16.98	0.96	0.04	16.98
20	Multan	0.84	0.058	3.98	0.87	0.057	4.98
21	MP Khas	0.84	0.06	3.98	0.59	0.09	1.31
22	Mianwali	0.87	0.06	4.98	0.82	0.06	3.49
23	Nawabshah	0.93	0.048	9.55	0.96	0.045	16.98
24	Okara	0.87	0.05	4.98	0.92	0.04	8.31
25	Peshawar	0.87	0.06	4.98	0.74	0.07	2.30
26	Quetta	0.92	0.056	8.31	0.77	0.07	2.65
27	Rawalpindi	0.94	0.04	11.20	0.89	0.05	5.95
28	Shadadpur	0.87	0.065	4.98	0.77	0.07	2.65
29	Sargodha	0.93	0.04	9.55	0.88	0.047	5.42
30	Sukkur	0.91	0.05	7.35	0.87	0.06	4.98
31	Sialkot	0.68	0.08	1.80	0.8	0.06	3.11
32	Samundri	0.97	0.03	22.76	0.92	0.05	8.31
33	Turbat	0.82	0.07	3.49	0.79	0.06	2.94
34	Vehari	0.98	0.025	34.31	0.99	0.017	68.97
	Avg-Pakistan	0.89	0.05	5.94	0.86	0.05	4.82

V. CONCLUSION

This study provides empirical evidence in favour of relative city price convergence in 35 Pakistani cities with two numeraire cities Lahore and Karachi using monthly CPI data from July 2001-June 2008. The empirical evidence supports that Purchasing Power

parity holds in Pakistan with both the techniques OLS and GLS. However the average half life of a price shock is estimated to be less than 5 months with GLS and 6 months with OLS. There is a significant evidence of differences in city behaviours in terms of the duration of half life shock. The individual cities' half life of shock varies from almost 1.3 months to 68 months which is huge. The half life of relative price shock with Lahore is smaller than Karachi implying the fact that cities are spatially more associated with Lahore than Karachi.

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The Price Puzzle and Monetary Policy Transmission Mechanism in Pakistan: Structural Vector Autoregressive Approach

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1. INTRODUCTION

The prime objective of economic policies is to increase the welfare of the general public and the monetary policy supports this broad objective by focusing its efforts to promote price stability. The growing importance of monetary policy stabilisation efforts may reflect both political and economic realities. Understanding the transmission mechanism of monetary policy to inflation and other real economic variables is imperative for central bankers to conduct monetary policy effectively. High inflation reduces growth by reducing investment and productivity growth which reduces the welfare, gives a theoretical foundation for the choice of price stability as an objective of monetary policy. These arguments about monetary policy objectives lead to the choice of price stability as the single or primary objective of monetary policy. Monetary policy is one of the important tools with the monetary authorities to achieve the objectives of price stability. There is extensive theoretical as well as empirical literature available on the effects of monetary policy shocks on the real economic aggregates and prices.

A tightening of monetary policy generally is expected to reduce the output and prices. The feedback of prices to a monetary policy shock is sometimes contrary to the conventional views of monetary policy transmission mechanism, known as price puzzle. According to the conventional views of monetary transmission mechanism, tight monetary policy is associated with a fall in the money supply and output. However, the monetary tightening is associated with an increase in the price level rather than decrease [Sims (1992)].

In the literature, numbers of explanations are available for price puzzle. To resolve the price puzzle, Sims (1992) proposed introduction of the commodity prices and Giordani (2004) suggested adding the potential output. Sims (1992) proposed that price puzzle might be due the fact that interest rate innovations partially reflect inflationary pressure that lead to price increases and introduction of commodity price index in the VAR appears to capture enough additional information about future

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inflation. So the introduction of the commodity price may resolve the price puzzle. Sims, (1992) and Grilli and Roubini, (1995) provided the evidence that this explanation of the price puzzle might also explain the exchange rate puzzle. Sims and Zha (1995) proposed structural VAR approach with contemporaneous restrictions that includes variables proxying for expected inflation. Castelnuovo, *et al.* (2010) proposed that the positive response of prices to a monetary policy shock is associated with a weak interest rate response to inflation. Krusec (2010) argue that imposing the long run restrictions in the cointegrated structural VAR framework can resolve the price puzzle. The advantage of long-run identification is that there is no need for additional variables besides prices, interest rate and output. Sims and Zha (2006) suggest that change in the systematic component of monetary policy have not allowed reduction in inflation or output variance without substantial costs. Inclusion of commodity prices resolves the price puzzle because they contain information that helps the Federal Reserve to forecast inflation [Hanson (2004)].

Pakistan is facing unprecedented high inflation and SBP has been using tight monetary policy to curb inflation. SBP use monetary aggregates (M2) as intermediate target in accordance with real GDP growth and inflation targets set by the Government. The selection of M2 as intermediate target to control inflation, based on two key assumptions that the demand for M2 function is stable and it has strong association with the rate of inflation [Qayyum (2008)]. Since 2005 SBP has been pursuing tight monetary policy to control inflation and the monetary authority mainly relay on interest rate channel. This brings to fore the question of effectiveness of the interest rate channel of the transmission mechanism. However, in case of developing countries including Pakistan the monetary policy actions transmit its affect on macroeconomic variables with a considerable lag and with high degree of volatility and uncertainty. Agha, *et al.* (2005) argue that monetary tightening in Pakistan leads first to a fall in domestic demand, primarily investment demand financed by bank lending, which translates into a gradual reduction in price pressures that eventually reduces the overall price level with a significant lag. The VAR modeling with Cholesky decomposition has been used in this study.

Interest rate and rate of inflation in Pakistan are rising during current decade and they have strong positive correlation. If rise in interest rate follows rise in price then we face price puzzle. The movements of interest rate and inflation can be depicted in Figure 1 which shows a positive relationship between discount rate and inflation although a number of other factors were at play. In Table 1, the coefficient of correlation between inflation and discount rate, 6-month treasure bill rate, call money rate is 0.34, 0.46 and 0.48 respectively over the period of full sample from 1991M1 to 2010M8. As it can be seen form Table 2 the coefficient of correlation between inflation and different measure of interest rate is much higher over the sub sample period from 2005:M1 to 2010: M8. The coefficients of correlation between inflation and discount rate, 6-month treasure bill rate, call money rate is 0.74, 0.65 and 0.67 respectively for the period 2005:M1 to 2010:M8. It implies that raising the interest rate in recent years has little impact on dampening inflation rather than it pushes up inflation.

Table 1

Correlation between Inflation and Different measure of Interest Rate (1991M1 to 2010M8)

	INF	R	TB6	CMR	ER	M2G
INF	1.00	0.34	0.46	0.48	0.03	0.03
R	0.34	1.00	0.81	0.59	–0.23	–0.22
TB6	0.46	0.81	1.00	0.73	–0.28	–0.03
CMR	0.48	0.59	0.73	1.00	0.00	–0.12
ER	0.03	–0.23	–0.28	0.00	1.00	–0.45
M2G	0.03	–0.22	–0.03	–0.12	–0.45	1.00

Table 2

Correlation between Inflation and Different measure of Interest Rate (2005M1 to 2010M8)

	INF	R	TB6	CMR	ER	M2G
INF	1.00	0.74	0.65	0.67	0.56	–0.70
R	0.74	1.00	0.95	0.78	0.89	–0.85
TB6	0.65	0.95	1.00	0.83	0.89	–0.79
CMR	0.67	0.78	0.83	1.00	0.72	–0.72
ER	0.56	0.89	0.89	0.72	1.00	–0.72
M2G	–0.70	–0.85	–0.79	–0.72	–0.72	1.00

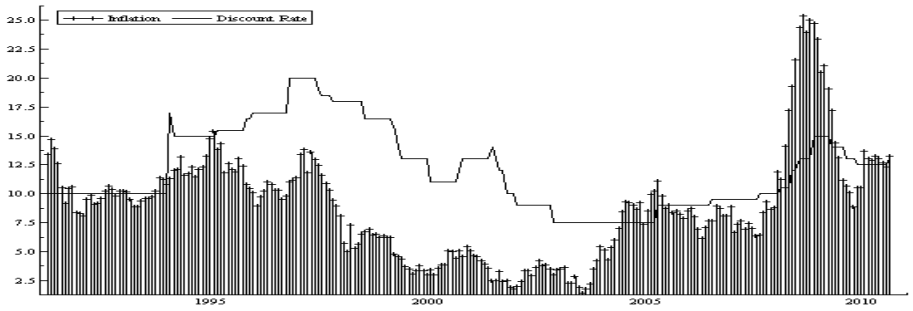

Fig. 1. Inflation and Interest Rate (1990: M1 to 2010:M8)

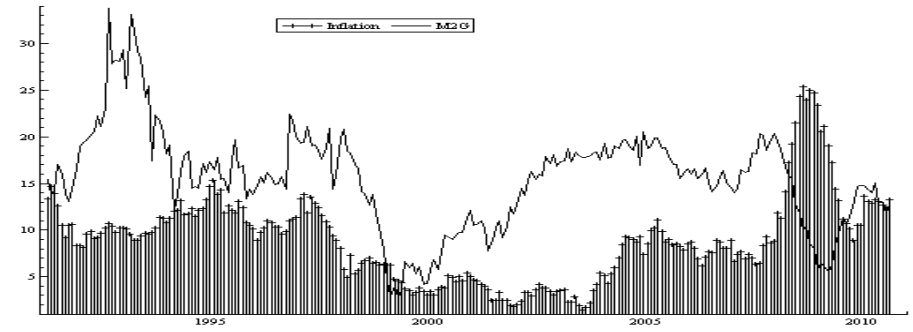

Fig. 2. Inflation and M2 growth (1990: M1 to 2010: M08)

Qayyum (2008) and Omer and Saqib (2008) analyse the performance of monetary targeting in Pakistan. Since 1991 most of the time M2 growth remains higher than the target rate of money growth set by the SBP to control inflation. Qayyum (2008) also argued that positive deviation of money growth from target level is indication for higher inflation in future. Similarly Omer and Saqib (2008) study suggests that that income velocity of money is not stable in Pakistan and suggest that monetary authority in Pakistan should rethink on monetary targeting strategy in Pakistan. It is argued in *PIDE Monetary Policy Viewpoint* (2010) that a tight monetary policy stance through increase in the discount rate serves little purpose in the current conditions.

In the light of above mentioned facts, this study presents an empirical analysis of the relationship between the interest rate, inflation and exchange rate in Pakistan. The objective of this study is to examine the effects of tight monetary policy on price level and other macroeconomic variables such as output, exchange rate and money supply within the structural VAR frameworks. Monthly data on consumer price index, Monetary aggregate (M2), Industrial production, world oil price and nominal exchange rate has been used over the period 1992: M1 to 2010:M08. All the variables are used in logarithmic form except interest rate. Data are taken from International financial statistics.

The outcome of the study will provide useful insight into the monetary policy transmission mechanism and will help the policy-makers to address the issue of monetary policy effectiveness.

The remainder of the study organised in the following manner. Model specification and econometrics technique used for estimation are described in Section 2. Empirical results are presented in Section 3. Section 4 contains concluding remarks and policy recommendations.

2. METHODOLOGY: STRUCTURAL VAR MODELING

We assume the economy is described by a structural form equation

$$G(L)\, y_t = e_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

where $G(L)$ is a matrix polynomial in the lag operator L, y_t is an $n\times1$ data vector, and e_t is an $n\times1$ structural disturbances vector. e_t is serially uncorrelated and $\text{var}(e_t) = \Lambda$ and Λ is a diagonal matrix where diagonal elements are the variances of structural disturbances; therefore, structural disturbances are assumed to be mutually uncorrelated.

We can estimate a reduced form equation (VAR)

$$y_t = B(L)\, y_t + u_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

where $B(L)$ is a matrix polynomial (without the constant term) in lag operator L and $\text{var}(u_t) = \sum$.

A popular and convenient method is to orthogonalise reduced form disturbances by Cholesky decomposition as in Sims (1980). However, in this approach to identification, we can assume only a recursive structure. The innovations in Choleski decomposition do not have a direct economic interpretation [Enders (2004)]. Blanchard and Watson (1986), Bernanke (1986), and Sims (1986) suggest modelling the innovations using economic analysis. A structural model (SVAR) in which non- recursive structures

are allowed and specifies a set of restrictions only on contemporaneous structural parameters.

Let G_0 be the coefficient matrix (non-singular) on L^0 in $G(L)$, that is, the contemporaneous coefficient matrix in the structural form, and let $G^0(L)$ be the coefficient matrix in $G(L)$ without contemporaneous coefficient G_0. That is

$$G(L) = G_0 + G^0(L) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

Then, the parameter in the structural form equation and those in the reduced form equation are related by

$$B(L) = - G_0^{-1} G^0(L) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

In addition, the structural disturbances and the reduced form residuals are related by $et = G_0 u_t$, which implies

$$\sum = G_0^{-1} \Lambda G_0^{-1} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

Maximum likelihood estimates of Λ and G_0 can be obtained only through sample estimates of $\sum$. The right hand side of Equation (5) has n×(n+1) free parameter to be estimated. Since $\sum$ contains $n\times(n+1)/2$ parameters, we need at least $n\times(n+1)/2$ restrictions. To identify the structural model after normalising n diagonal elements of G_0 to 1, it is necessary to impose $n\times(n-1)/2$ restrictions on G_0. In the VAR modelling with Cholesky decomposition require all elements above the principal diagonal to be zero. However, in the structural VAR approach G_0 can be any structure as it has enough restrictions.

2.1. Identification of Monetary Policy Shocks

The variables included in the study are short term interest rate (R), monetary aggregate as measured by (M2), the consumer price index (CPI), Industrial production index (IP), world price of oil (WOP) and the exchange rate (ER) expressed as units of domestic currency for one unit of U.S. dollar. Short term interest rate (R) is monetary policy instrument and M2 is intermediate target variable. The ultimate targets that monetary authority would like to control are macroeconomic goal variables such as prices and growth. Industrial production is used as proxy for real economic growth. By controlling the intermediate target variable, policy-makers believe that they are influencing the ultimate policy targets in a predictable way. With a monetary aggregate as an intermediate target, the implicit assumption is that, other things being equal, higher rates of growth in the money supply increase the inflation and level of economic activity in the short run. Slower monetary growth rates are associated with lower inflation rates and level of economic activity.

The world price of oil is included in monetary policy reaction function to control the negative supply shock and inflationary pressure. The exchange rate is included in the monetary policy reaction function to capture the effect of interest rate innovations on the exchange rate. Exchange rate is an important channel through which monetary policy affect output and prices. Higher interest rates make domestic financial assets attractive and this induces the appreciation of the domestic currency.

For the restrictions on the contemporaneous structural parameters G_0, we follow the general idea of Sims and Zha (1995) and Kim and Roubini (2000). The following equations summarises our identification scheme based on Equation (5), $e_t = G_0 u_t$

$$\begin{bmatrix} e_{MS} \\ e_{MD} \\ e_{CPI} \\ e_{IP} \\ e_{WOP} \\ e_{ER} \end{bmatrix} = \begin{bmatrix} 1 & g_{12} & 0 & 0 & g_{15} & g_{16} \\ g_{12} & 1 & g_{23} & g_{24} & 0 & 0 \\ 0 & 0 & 1 & g_{34} & g_{35} & 0 \\ 0 & 0 & 0 & 1 & g_{45} & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ g_{61} & g_{62} & g_{63} & g_{64} & g_{65} & 1 \end{bmatrix} \begin{bmatrix} u_R \\ u_M \\ u_{CPI} \\ u_{IP} \\ u_{WOP} \\ u_{ER} \end{bmatrix} \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

There are 16 zero restrictions on the g_{ij} parameters, the system is over identified; with six variables, exact identification requires only $(6^2–6)/2=15$ restrictions.

Where e_{MS},e_{MD} e_{CPI}, e_{IP}, e_{WOP}, e_{ER} are the structural disturbances, that is, money supply shocks, money demand shocks, CPI shocks, IP shocks, WOP shocks, and ER shocks, respectively, and u_R, u_M, u_{CPI}, u_{IP}, u_{WOP}, and u_{ER} are the residuals in the reduced form equations, which represent unexpected movements (given information in the system) of each variable.

The money supply equation is assumed to be the reaction function of the monetary authority, which sets the interest rate after observing the current value of money, the exchange rate and the world price of oil but not the current values of output, and the price level, As in Sims and Zha (1995) and Kim and Roubini (2000), the choice of this monetary policy feedback rule is based on the assumption of information delays that do not allow the monetary policy to respond within the period to price level and output developments. These studies assume that monetary authority cannot observe and react to aggregate output data and aggregate price data within a month.

The demand for real money balances depends on real income and the opportunity cost of holding money—the nominal interest rate. So, in our money demand equation, we exclude (contemporaneously) the world price of oil and the exchange rate. For the other equations, our general assumption is that real activity responds to price and financial signals (interest rates and exchange rates) only with a lag. The interest rates, money, and the exchange rate are assumed not to affect the level of real activity contemporaneously. They are assumed to affect real activity with a one-period lag. While exchange rates will eventually feed through to the domestic CPI. Since oil is a crucial input for most economic sectors, the price of oil is assumed to affect prices and the real sector contemporaneously. Kim and Roubini (2000) proposed that firms do not change their output and price unexpectedly in response to unexpected changes in financial signals or monetary policy within a month due to inertia, adjustment costs and planning delays, but they do in response to those in oil prices following their mark-up rule.

The identifying restriction in the equations for the price of oil takes these variables as being contemporaneously exogenous to any variable in the domestic economy. Since the exchange rate is a forward-looking asset price, we assume that all variables have contemporaneous effects on the exchange rate in this equation.

In summary, the structural shocks are composed of several blocks. The first two equations are money supply and money demand equations which describe money market

equilibrium. The next two describe the domestic goods market equilibrium; the fifth and sixth equations represent the exogenous shocks originating from the world economy, and oil price shocks. The last is the arbitrage equation describing exchange rate market.

In Table 3, we report the estimated coefficients. On the basis of Akick Information Criteria (AIC) four 4 lags were used in SVAR estimation.

Table 3

Contemporaneous Coefficient in the Structural Model

	Coefficient	Standard Error
g_{12}	–13.98	86.57
g_{15}	6.85	25.35
g_{16}	–240.17	871.78
g_{21}	–0.011	0.104
g_{23}	0.677	0.35
g_{24}	–0.35	0.04
g_{34}	0.0122	0.005
g_{35}	–0.021	0.005
g_{45}	0.034	0.064
g_{61}	0.575	7.91
g_{62}	9.997	217.06
g_{63}	4.989	123.97
g_{64}	–0.599	11.05
g_{65}	–0.1176	1.35

Likelihood test of over-identifying restriction χ^2 (1) =0.018 [0.8912].[1]

The estimated values of g_{12} and g_{16} are negative implies that the monetary authority increase interest rate when it observes unexpected increases in the monetary aggregates and unexpected exchange rate depreciation. Kim and Roubini (2000) finding support these results. The likelihood ratio test of the over-identifying restriction shows that identifying restrictions are not rejected.

3. THE EFFECT OF MONETARY POLICY SHOCKS

Theoretically tight monetary policy stance implies that rise in interest rate cause fall in monetary aggregate initially and the price level declines with no increase in output level. There is a possibility that output increase or a price level increase after a monetary contraction, but if the monetary contraction is exogenous in the sense that it is independent of any systematic response to any shock such as oil shocks, inflationary pressure, money demand shocks, then almost no theory implies that the output or price level should increase [Kim and Roubini (2000)].

In case of tight monetary policy stance, higher interest rate would put pressure on the exchange rate to appreciate for given expected inflation. However, not all increases in interest rates will be associated with a currency appreciation, if there is an increase in expected inflation, the consequent Fisherian increase in the nominal interest rate would be associated with an impact depreciation of the exchange rate. Therefore, the

[1]Probability are given in the bracket.

response of the exchange rate to an increase in the interest rate will depend on whether it is the nominal or the real interest rate that is increasing.

3.1. Empirical Results

In Figure 3 we display the estimated impulse responses. Figure gives the impulse responses (over 48 months) to a one-standard-deviation positive interest rate shock (i.e., a monetary contraction). In response to interest rate shock initially the money supply rises smoothly over some horizon then falls, Consider now the impulse response of the other variables to the contractionary monetary shock. The monetary contraction leads to a persistent rise in the price level. The rise in the price level is persistent over the full 48 months horizon and this rise is statistically significant over the full horizon.

In Pakistan, combinations of factors have been contributing to push up inflation for last several years. Foremost are, government borrowing from SBP to finance deficit, continuously rising energy and food prices and low policy credibility. These factors are also contributing about high inflation expectations in the future. Energy and other commodity prices work through supply chain. Inflation in Pakistan, in recent year, is largely being driven by supply shocks. This may be the reason that tight monetary policy of the SBP since the period of double digit inflation has so far never meets its target of inflation.

Barth and Ramsey (2000) argued that cost channel is an important part of monetary policy transmission mechanism. As oppose to the conventional views of monetary policy transmission mechanism which focus on the demand side effects-a monetary tightening initially reduces output and then prices, the contrast, the cost channel of monetary transmission stresses that supply side or cost effects might dominate the usual demand side effects and therefore, monetary tightening could be followed by an increase in prices. In this view, a rise in interest rates increases the cost of funds that raises the cost of holding inventories. Accordingly the cost shock pushes up prices.

Consider next the effects on the level of output. The output increase over some horizon following the monetary contraction but continuously falls after initial rise.

We now consider the effects of the monetary policy shocks on the level of the exchange rate. The effect of a monetary contraction (an increase of the domestic interest rate) is a depreciation of the domestic currency relative to the U.S. dollar. This depreciation of the domestic currency following the interest rate shock prolong and persistent over the 48-month of horizon. These results are contradictory with Grilli and Roubini (1995) suggest that a positive interest differential in favour of domestic assets is associated with a persistent appreciation of the domestic currency. Exchange rate is an important channel through which monetary policy affects output and prices. Higher interest rates make domestic financial assets attractive and this induces the appreciation of the domestic currency. But due to the lack of competiveness of the external sector of the economy, domestic currency is continuously in pressure. The rupee has been under constant pressure owing to weaknesses in the external sector as well as high domestic inflation.

We also examined the impulse responses to oil price shocks (Figure 4). In response to oil price shocks, we find a interest rate increase up to 24 month after initial fall, and price increases which is consistent with monetary contraction after an inflationary oil price shock. In conclusion the inclusion of the oil price seems important in identifying monetary policy shocks.

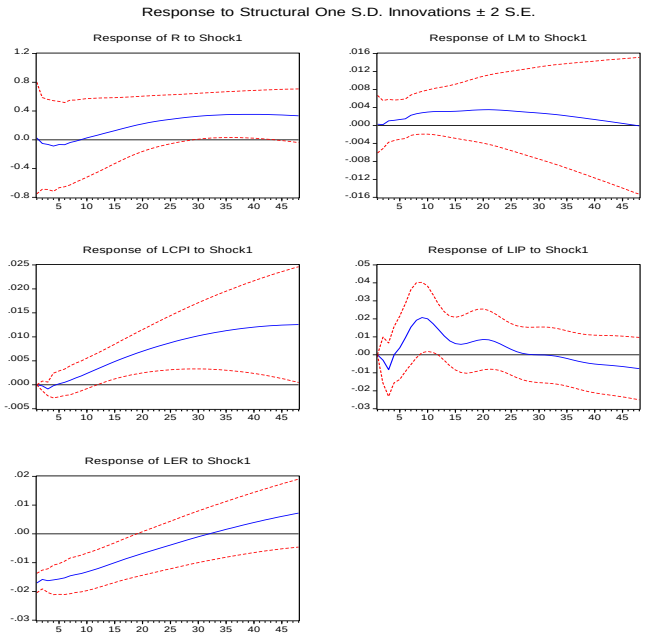

Fig. 3. Impulse Responses to Interest Rate Shocks

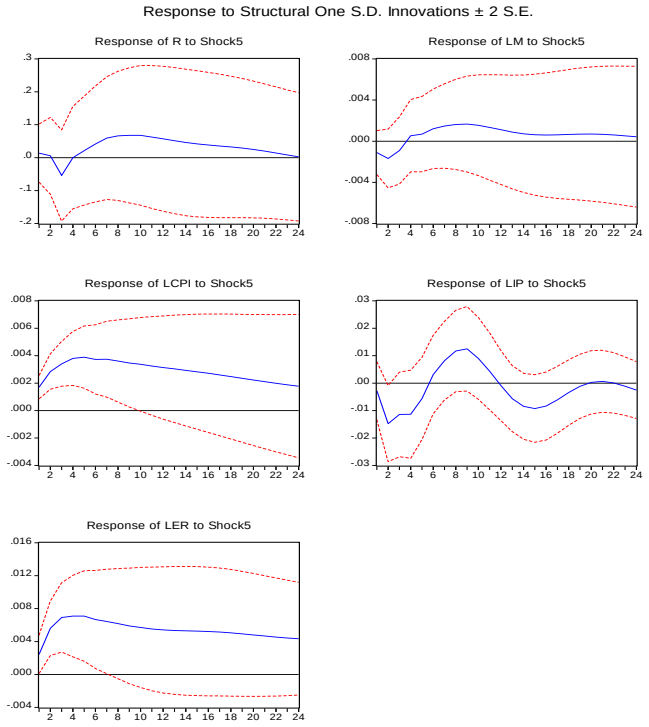

Fig. 4. Impulse Responses to Oil Price Shocks

3.2. Sources of Output and Nominal Exchange Rate Fluctuations

We report the results regarding the sources of output fluctuations and nominal exchange rate fluctuations. In Table 4, we report the forecast error variance decomposition of industrial production and in Table 5 the forecast error variance of nominal exchange rate. First the interest rate shocks' contribution in explaining output fluctuations is about 9 percent at the peak, which implies that monetary policy shocks are not the dominant sources of output fluctuations in Pakistan. This result supports the finding of Kim (1999): monetary policy shocks are not major sources of output fluctuations in G-7 countries. The oil price shocks explain only 4 percent variation in output in a 48-month horizon. This result is contradictory with the finding of Kim and Roubini (2000). One possible justification for this finding is that for a long time there was a subsidy on oil prices in Pakistan. Third, monetary policy shocks explain a very large proportion of exchange rate fluctuations in the short-run. Over 70 percent of nominal exchange rate fluctuations are due to monetary policy shocks at 6-month horizon and 43 percent fluctuation in exchange rate is explained over the six month horizon.

Table 4

Forecast Error Variance of Output

Period	r	lm	lcpi	lwop	ler
12	9.369639	11.34967	1.872975	4.378689	3.791765
24	9.565921	16.48867	5.385525	4.505386	5.20493
36	8.799081	18.38105	8.404445	4.393734	5.860243
48	9.529952	18.52376	10.52516	4.185117	6.102113

Table 5

Forecast Error Variance of Nominal Exchange Rate

Period	r	lm	lcpi
6	73.37099	9.621603	4.117469
12	66.77105	10.60053	9.727755
24	55.44579	10.02899	20.81497
36	46.64165	8.588692	30.8504
37	46.11865	8.484925	31.51996
48	43.15545	8.058522	36.01111

4. CONCLUSION

In this paper we investigate the effects of monetary policy shocks on the prices and other macroeconomic variables within a structural vector autoregressive (SVAR) model approach. Our finding suggests that a positive interest rate shock (contractionary monetary policy) leads to persistent rise in the price level over 48-month horizon. A tightening of monetary policy generally is expected to reduce the price level, not increase it. Results indicate the existence of price puzzle in Pakistan over the period studied. It is also suggested that monetary policy shocks are not the dominant sources of output fluctuations in Pakistan. Tight monetary policy stance through increase in the discount

rate serves little purpose in the current conditions. Indeed, it only further squeezes the private sector and discourages private investment which is already facing an extremely difficult situation (*PIDE Monetary Policy Viewpoint*). The results also indicate that monetary contractions in Pakistan over period reviewed associated with persistent depreciation of domestic currency value relative to the U.S. dollar. Supply shock is the major source of inflation in Pakistan, so the only tight monetary policy is not the solution of the problem. Monetisation of fiscal deficit is also contributing factor in inflation, therefore both monetary and fiscal policy should be used to curb the inflation.

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Corporate Governance and Performance of Financial Institutions in Pakistan: A Comparison between Conventional and Islamic Banks in Pakistan

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INTRODUCTION

Corporate Governance refers to the way an organisation is directed, administrated or controlled. It includes the set of rules and regulations that affect the manager's decision and contribute to the way company is perceived by the current and potential stakeholders. The corporate governance structure specifies the distribution of rights and responsibilities among different participants in the corporation such as; boards, managers, shareholders and other stakeholders and spells out the rules and procedures and also decision-making assistance on corporate affairs. By doing this, it also provides the structure through which the company's objectives are set and the means of obtaining those objectives and monitoring performance. Corporate governance may be the ways of bringing the interests of investors and managers into line and ensuring that firms are run for the benefit of investors.

Effective corporate governance mobilises the capital annexed with the promotion of efficient use of resources both within the company and the larger economy. It also assists in attracting lower cost investment capital by improving domestic as well as international investor's confidence. Good corporate governance ensures the accountability of the management and the Board. The Board of directors will also ensure legal compliance and take impartial decisions for the betterment of the business. It is understood that efficient corporate governance will make it difficult for corrupt practices to develop and take root, though it may not eradicate them immediately.

Corporate governance swivel around some important aspects such as Role of board of directors, Basic structure of board of directors, its remuneration, Ownership of director, Availability of freedom to an enterprise, Role of services of institutional directors, Accountability of member of BoD, Financial reporting, Institutionalisation of audit functions and linkage with shareholders. Good corporate governance can add value

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to developing sound corporate management and enriching the results of corporate entities for society in general and shareholders in particular to be the beneficiaries.

The developed countries like US, UK, Germany, Hong Kong and etc. have developed different models of corporate governance which now implemented there in true spirit. The World Bank also showed interest in this topic and developed a World Governance Index (WGI). The objective of this index is to evaluate the corporate performance of different countries on the basis of Regulations, Corruption and Rule of Law. The results of the index showed that the performer in corporate governance was Germany with a score of 90.8 percent and worst performer is Bangladesh with a score of 24.3.

Given the state of the economy of Pakistan in 2010, troubled as it is; ideally it would be more desirable to look at the governance issues at macro level for Pakistan. The financial and administrative turn-around of eight loss-making public sector entities is the biggest challenge for the government to improve governance and put national economy back on track. As a famous economist, Dr Shahid Javaid Burki—a long observer of Pakistan's economy has recently stated *"Pakistan can generate a greater bounce in its economy than India by creating better governance. It has occurred before in the country's difficult economic history and could happen again." (Improved Governance:* Dawn, 12th, October 2010).

However, as a starting point, in this paper we look at closely the governance issues for the financial sector, a sector which has played a significant role till recent years in economic activity of Pakistan. Rehman, *et al.* (2010) have looked at the issue of corporate governance in Chemical and Pharmaceutical sectors of Pakistan and found that there is a significant impact of corporate governance on the shareholder's returns in pharmaceutical sector of Pakistan. Corporate governance has become an issue of global significance. The improvement of corporate governance practices is widely recognised as one of the essential elements in strengthening the foundation for the long-term economic performance of countries and corporations. In Pakistan, the first Code of Corporate Governance for Pakistan was finalised and issued by SECP in March 2002. Then it was subsequently incorporated in all the listed companies of three stock exchanges in Pakistan. In 2004, SECP took the first step to establish the Pakistan Institute of Corporate Governance in public private partnership.

According to "A Survey of Corporate Governance Practices in Pakistan, 2007", conducted by: International Finance Corporation and SECP, 92 percent respondents prepare annual "Statement of Ethics and Business Policy", 48 percent had "Vision and Mission Statement", and none of the respondents have Code of Corporate Governance. On the other hand, it was also found that 50 percent of the corporations in Pakistan did not include non-executive directors in their board of directors, 54 percent have not introduced transaction administration procedure, 53 percent have not implement a formal remuneration system, and 55 percent did not have corporate governance improvement plan. Whereas, 31 percent respondents did not identify the barriers to improve the corporate governance, 69 percent identified the barriers, 42 percent had non availability of qualified staff to implement and 21 percent did have the claim that corporate governance produces sensitive information that cannot be shared with the competitors.

Even though many studies have conducted on corporate governance issues in the non-financial sectors, a few studies examine the corporate governance issues in the banking sector [Wright, *et al.* (2002); Kinti, *et al.* (2004); Berger, *et al*. (2005)]. This paper focuses on corporate governance impact on financial sector of Pakistan.

LITERATURE REVIEW

Several empirical studies have investigated the association between corporate governance and firm performance [Yermack (1996); Claessens, *et al.* (2000); Klapper and Love (2002); Gompers, *et al.* (2003); Black, *et al.* (2003); Sanda, *et al.* (2005)], with inconclusive results. Adjaoud, *et al.* (2007) concluded that there is little evidence of a systematic relationship between the characteristics of the board. Bhagat, *et al*. (2000) and Weir, *et al.* (1999) experienced a positive relationship between corporate governance and firm performance. Albeit Eisenberg, *et al*. (1998) observed a negative relationship between them.

Corporate governance contains various aspects of complex regimes as Zingales (1998) also examines it as a comprehensively broad, multifaceted notion that is enormously relevant, while difficult to define, due to the variety of scope that it encompasses. Friend and Lang (1998) examine that shareholders, having high concentration in firms, play an important role to control and direct the management to take keen interest in benefit of the concentration group. In addition corporate governance regimes also allow shareholders to direct the management for betterment of their investment. Shleifer, *et al*. (1997) describe that concentration groups with large share holdings; check the manager's activities better. However, the check and balance not only causes to reduce the agency cost but also resolves the issues between managers and owners. Furthermore, Williamson (1988) examined the relationship between corporate governance and securities. Jensen (1986) seems to be quite keen to analyse how corporate governance directly or indirectly influences the capital structure and firm value. While, Driffield, *et al*. (2007) found that higher ownership concentration has a positive impact on capital structure and firm value. In the case of lower ownership concentration, the relationship depends upon the strictness of managerial decision making which enforce to bring change in the capital structure.

For the US market, Gompers, *et al.* (2003) analysed the relationship between corporate governance, long-term equity returns, firm value and accounting measures of performance, while Rob Bauer, *et al.* (2004) found combined relationship between corporate governance, firm value and equity returns. Substantial differences are found between the UK market and the Euro-zone markets. Many studies prove that there is no linkage between corporate governance and performance. Beth (2003) concluded that there is no impact of director independence on firm performance. Several studies have been conducted so far and still going on to examine the relationship between firm performance and corporate governance mechanisms, but the results are mixed [Kajola *et al*. (2008)]. Anthony, *et al.* (2007) observed that the sector and country has a significant effect while examining the impact of corporate governance on firm performance.

According to Maria Mahar and Thomas Anderson (2008) there are some weaknesses, strengths and economic implications associated with corporate governance systems. It is widely believed that good corporate governance is an important factor in

improving the value of a firm in both developing and developed financial markets. However, the relationship between corporate governance and the value of a firm differs in emerging and mature financial markets due to disparate corporate governance structures in these markets resulting from dissimilar social, economic and regulatory conditions in these countries. There is a need to understand the differences which affect the value of a firm for academic investigations, financial and management practices and public regulation of corporations and markets. The variables used by Kashif Rashid (2008): price to book value ratio, market capitalisation, gearing ratio, return on total assets, shareholder's concentration (agency cost), CEO duality, board size, and judicial and regulatory authority efficiency. Burki and Ahmad (2007) explored the changes of corporate governance in Pakistan's banking sector and its impact on their efficiencies.

For measuring corporate governance different variables are used by the researchers such as Board Size, Board Independence, Board meeting, Ownership structure, Family Ownership and Dual role of CEO. A widely debated corporate governance issue is whether the two most important positions in a company—the Chairman of the Board and the CEO—should be held by two different individuals (a dual leadership structure) or one person may be assigned both portfolios (a unitary leadership structure).

Many studies addressed the CEO duality-performance relationship; with inconsistent results [Boyd (1994)]. There is only weak evidence that duality status affects long-term performance, after controlling the other factors that might impact the performance. [Baliga, *et al.* (1995)]. Berg, *et al*. (1978) and Brickley, *et al.* (1997) concluded that there is a chance of agency cost when CEO performs dual role. Therefore, the separation of the two positions enhances shareholder value. Fama, *et al*. (1983) also argued that concentration of decision management and decision control in one individual reduces a board's effectiveness in monitoring top management. For example, when a CEO doubles as board chairman, this results in conflict of interests and increases agency costs.

A number of empirical studies have been conducted in the US to measure the impact of director independence and corporate performance. Some researchers found a direct evidence of a relationship between board composition in terms of independence and corporate performance. Kesner (1987), studying Fortune 500 companies found a positive and significant correlation between proportion of inside directors and two indicators of performance: profit margin and return on assets.

Baysinger, *et al*. (1985) and Hambrick, *et al*. (2000) found evidence for the proportion of independent non-executive directors to be positively correlated with the accounting measure of performance. On the other hand, studies by Klein (1998), Bhagat, *et al*. (1997), and Hermalin, *et al*. (1991) experienced a high proportion of independent directors does not predict a better future accounting performance. Using accounting measures Agrawal, *et al*. (1999) observed a negative relationship between board independence and firm's performance. Jeffrey, *et al*. (1990) found no evidence in favour of outside directors to enhance the firm performance.

For a better performance of a corporation it is necessary to monitor the operations of the firm regularly, it can be done by increasing the board meetings in a given year. The frequency of board meeting is an important dimension of board operations [Nikos (1999)]. He found the annual number of board meetings is inversely related to firm value.

When independent from management, the Chairman can play a pivotal role in giving directors (particularly non-executive directors) a strong voice in setting agendas of Board meetings, deciding on executive compensation and encouraging meaningful discussions in Board meetings.

Sanda, *et al.* (2005) and David, *et al*. (1996) found a positive relationship between small-sized boards and corporate performance. Board size is found to be a positively correlated with firm value in between-firms tests, and changes in board size are found to be positively associated with annual stock returns [Mak and Kusnadi (2005)]. Small board of directors is more effective [Yermack (1996)]. Holthausen and Larcker (1993b) fail to find consistence evidence of an association between board size and company performance.

Jiang (2004) explored that an ownership structure and firm performance can be positive or negative relationship depending upon the sectors and time period. Jensen, *et al.* (2004) specifically identified that "the fraction of the equity held by the manager" as a fundamental to ownership structure. This same rationale has been applied to board members as well [Dalton, *et al.* (2003)]. Officers and directors, in various combinations, constitute inside equity holders [Bethel, *et al*. (1993)]. Dong-Sung, *et al*. (2007) concluded that it is not important in case of Korean firms that who is CEO, but it is matter a lot that who the large shareholders. As large is the shareholder ownership it influences more on corporate performance. But in case of managerial ownership, it does not make any impact on firm performance. Inside equity holders are mainly CEOs, officers, or directors, Demsetz (1983) and Fama, *et al*. (1983) suggested that there is a positive relationship between an inside ownership and corporate performance. Dan (2003) results illustrated relatively low relationships between various categories of equity concentration and multiple indicators of financial performance.

Shahid, *et al*. (2004) concluded that the family control have positive effect on firm performance. Miller, *et al*. (2007) confirmed the difficulty of attributing superior performance to a particular governance variable. Older firms are generally family-controlled, dispelling the notion that ownership becomes dispersed over time. The positive abnormal returns are greater for family controlled firms [Walid, *et al*. (2006)]. Significant corporate wealth in East Asia is concentrated among a few families [Stijn, *et al*. (2000)]. Pakistani market is also characterised with the concept of dominance of family business where they developed as group and their performance is distinguish from the firms which are not under any group as observed in Japan. [Nishat, *et al*. (2004)].

HISTORY OF BANKING SECTOR AND CORPORATE GOVERNANCE IN PAKISTAN

Over the past two decades, financial sector in Pakistan had undergone a phenomenon changes. The transformation is taken place by introducing financial reforms in this country. These financial reforms play a significant role in the growth of this sector. Privatisation, restructuring of state owned banks, merger and acquisitions of private and foreign banks and introduction of Islamic banks have changed the governance structure of banking sector substantially. Before these reforms, financial sector in Pakistan mainly considered as a government sector. More than 90 percent market share was owned by state owned banks. These banks served as a tool to implement the government

development strategy. In 1972, all commercial banks had been nationalised expect few foreign banks. These foreign banks could not expand their operations due to strong regulations. These banks were used to give credit to the preferred sectors of the economy and also loans were given on the political basis. Initially, the arrangement gave good results but it did not sustain longer. The inefficiency of the banking sector observed shortly due to bad and influential governance by the government authorities. The proportion of non- performing loans were increasing day by day which results in high default rates of state owned banks.

The situation was realised shortly and new financial reforms introduced by State Bank of Pakistan in early 1990. The objective of these reforms was to strengthen the financial institutions by adopting the liberalisation policy in prudential regulations. The primary justification to introduce these reforms has been the potential to eliminate systematic sources of inefficiencies in the banking sector. Not only the inefficiencies but also to improve the governance structure of this sector.

In First part of these liberalisations and reforms, ten new private banks were permitted to start their operation in early 1990s. Apart from domestic private banks, three foreign banks were also permitted to start their operation in the same period. As a part of these reforms, the control on opening new bank branches by private and foreign banks was also lifted. At the same time, privatisation of state owned banks also took place by selling 26 percent shares of Muslim Commercial Banks to the private sector, 50 percent to the general public and remaining 24 percent also sold in 2001-02. Similarly, the privatisation of ABL, UBL and HBL were also taken place. Mass privatisation of state owned banks led to their market share down to 20 percent in 2005 as compared to 70 percent in 1990.

Secondly, state owned banks had also undergone through huge structural changes and downsizing. A fund was provided by the World Bank to state owned bank for their restructuring and downsizing in 1997. A large number of employees were voluntarily resigned from the banks under the golden shake hand scheme. Also, number of branches of state owned banks which were not performing well was also closed down.

Finally, the governance of banking sector in Pakistan was influenced by merger and acquisitions of some private and foreign banks. New policy introduced by State Bank of Pakistan has also encouraged merger and acquisition of small and struggling private and foreign banks by their financially superior counterparts. As a result, in a period of five years from 2000–2005, 12 banks are merged and acquired out of which nine foreign banks are acquired by the domestic private banks.

During this period, Islamic banking are also introduced by private and foreign banks in Pakistan. Initially, few Islamic banks are operated with a very little market share. But in very short period of time Islamic banking assets reaches to 411 billion with a massive growth rate of 6.1 percent. The investors are willing to invest in Islamic Banks rather than the conventional banks due to its strong governance structure. Pakistan has adopted an unusual three-tier *Shari'a-compliance* structure to ensure "deep and extensive" supervision of *Shari'a compliance*. The structure consists of the following components; (1) internal *Shari'a* advisers for Islamic banks, (2) a national *Shari'a-complaince* inspection unit, and (3) a national *Shari'a* advisory board established by the State Bank of Pakistan, the central bank [Akhtar (2006)].

The banking sector in Pakistan enjoyed healthy returns and achieved high growth after making necessary adjustment in their corporate governance structure. More liberal but concerned governance structure is established in this sector. No more political influence, corruption and unnecessary control of government are there. This strong corporate governance structure protects the right of shareholder's which enhances the confidence of external investor.

METHODOLOGY AND VARIABLE CONSTRUCTIONS

The performance of conventional and Islamic banks can be compared by their accounting returns and efficiencies. The analysis is conducted in two parts in first part the study makes a comparison between the average return on equity, return on assets, technical efficiency, allocative efficiency and cost efficiency of both segments. In second part, the impact of macroeconomic and corporate governance variables is observed on the performance of conventional and Islamic banks by using multiple regression models.

The annual returns on equity and returns on asset are collected from the financial statements of all conventional and Islamic banks for the period of 2003–2009. The selection of sample period is very critical because before 2003 there were no existence of Islamic banking in Pakistan. This study includes only those conventional banks who are not dealing in Islamic operations. The annual returns of all non Islamic conventional and Islamic banks are collected for the said sample period. By doing this, a cross sectional data stream is formed. The average returns of non Islamic conventional and Islamic banks are calculated and compared with independent t-sample test and find out any significance difference between them. The efficiencies of the selected sample banks are estimated by using the Data Envelopment Analysis for the same sample period. Deposits and net assets are taken as input variables while loans and advances and net investment as output variable for the purpose of estimating efficiencies of the banks.

In second part of the analysis, the impact of macroeconomic and corporate governance variables on the performance of these banks is studied by applying multiple regression models.

For This purpose, GDP growth rates and annual interest rates are collected from State Bank Pakistan as two macroeconomic variables for the period of 2003–2009. The corporate governance variable is added as a dummy variable in the models which indicates the presence of Shari'a Board in the bank. Following are the suggested models for this study.

Model – 1 $ROE = \alpha_1 + \beta_1 GDP(G) + \gamma_1 INT + \varepsilon_1 CG + \in$

Model – 2 $ROA = \alpha_2 + \beta_2 GDP(G) + \gamma_2 INT + \varepsilon_2 CG + \in$

Model –3 $TE = \alpha_3 + \beta_2 GDP(G) + \gamma_3 INT + \varepsilon_3 CG + \in$

Model – 4 $AE = \alpha_4 + \beta_4 GDP(G) + \gamma_4 INT + \varepsilon_4 CG + \in$

Model – 5 $CE = \alpha_5 + \beta_5 GDP(G) + \gamma_5 INT + \varepsilon_5 CG + \in$

Dependent Variables		**Independent Variables**	
Average Return on Equity	= ROE	GDP Growth Rate	= GDP(G)
Average Return on Asset	= ROA	Annual Interest Rate	= INT
Average Technical Efficiency	= TE	Corporate Governance	= CG
Average Allocative Efficiency	= AE		
Average Cost Efficiency	= CE		

RESULTS AND ANALYSIS

In the first part of analysis, average returns of equity and returns of assets are compared for conventional and Islamic banks of Pakistan.

Table 1

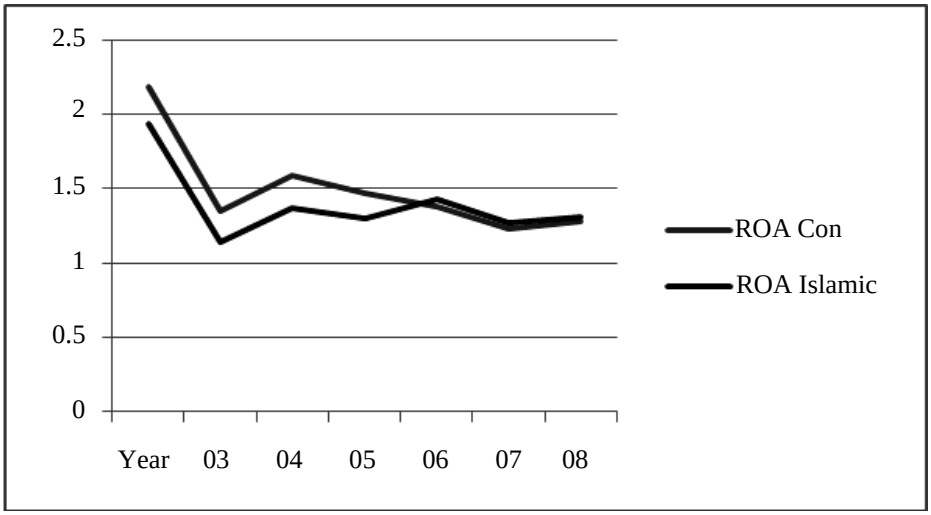
Comparison of Means of Performance Variables of Conventional and Islamic Banks

	Conventional Banks		Islamic Banks			
Items	Mean	SD	Mean	SD	t-Stat	P-Value
ROA	1.50	0.32	1.39	0.25	0.67	0.51
ROE	20.89	4.77	13.34	2.03	3.85	0.00***
TE	0.85	0.04	0.65	0.14	3.56	0.00***
AE	0.52	0.18	0.58	0.17	(0.70)	0.50
CE	0.53	0.14	0.51	0.09	0.29	0.77

Note: ***Significant at 1, 5 and 10 percent of significance.

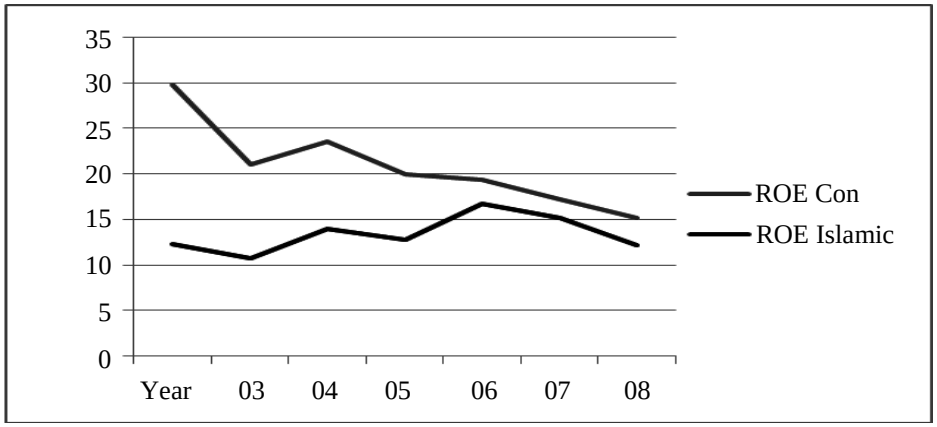
The results show that the average return on asset for conventional banks is 1.50 whereas the average return on asset for Islamic banks is 1.39. The p-value shows that there is no significant difference in average return on asset between conventional and Islamic banks.

Graph 1-1. Comparison between Average ROA of Conventional and Islamic Banks



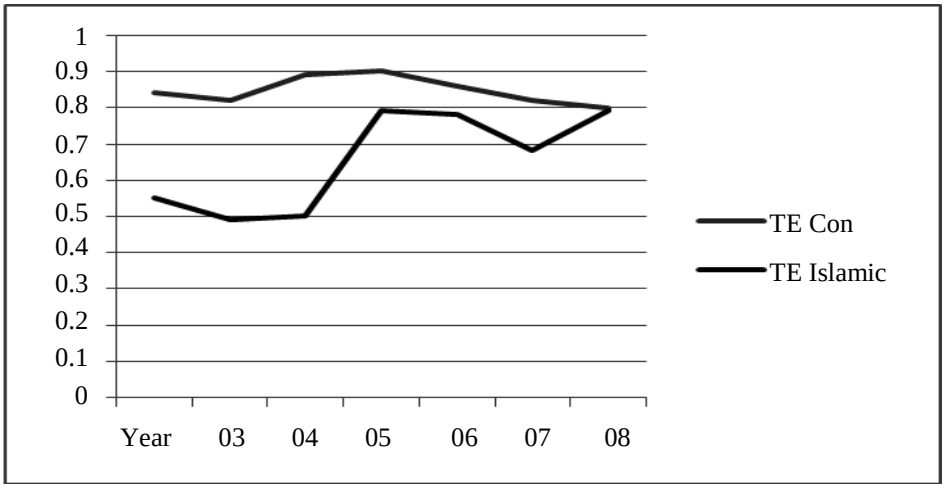
The average return on equity for conventional banks is 20.89 while for Islamic banks it is 13.34. The p-value of average return on equity is highly significant at 1, 5 and 10 percent level of significance. As show in graph 1-2, the trend of average return on equity is declining in later for both segments.

Graph 1-2. Comparison between Average ROE of Conventional and Islamic Banks



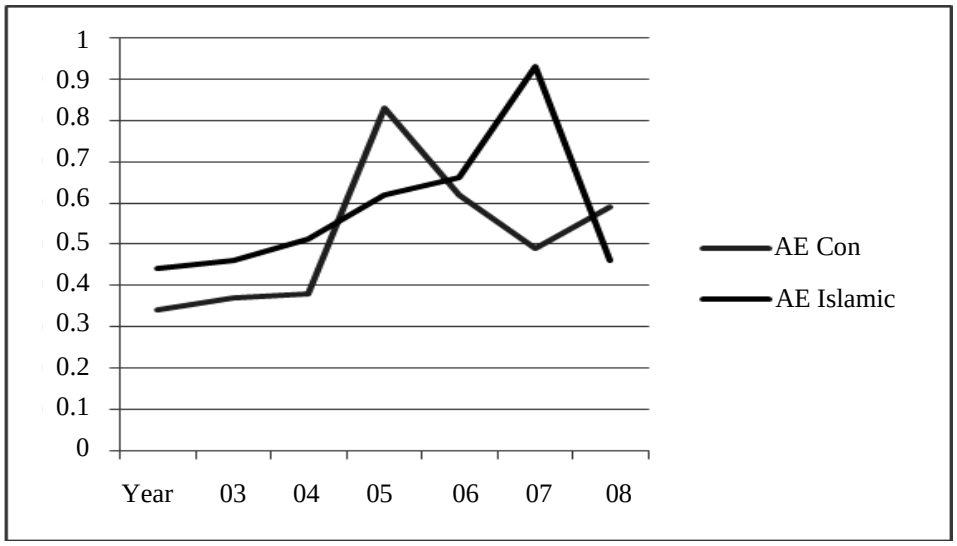
The average technical efficiency of conventional banks is 0.85 which is very much close with the world average banking efficiency i.e., 0.86. In case of Islamic banks average technical efficiency, it is 0.65. The p-value indicates that there is a highly significant difference between average technical efficiency of conventional and Islamic banks. The following graph shows the average technical efficiencies of conventional and Islamic banks over the sample period. It is clearly shown here that in the initial years Islamic banks technical efficiency was far behind as compared to conventional banks but in later years the Islamic banks technical efficiency approaches to conventional banks efficiency.

Graph 1-3. Comparison between Average TE of Conventional and Islamic Banks



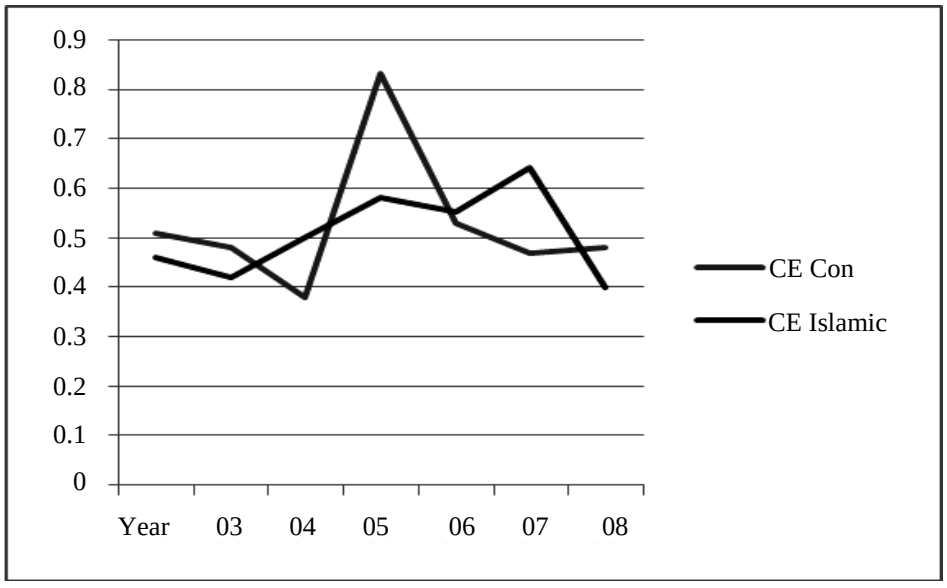
The average allocative efficiency of Islamic banks is 0.58 while for conventional banks it is 0.52. The p-value shows that there is no significant difference between average allocative efficiency of conventional and Islamic banks.

Graph 1-4. Comparison between Average AE of Conventional and Islamic Banks



In case of cost efficiency, the average score for Islamic banks is 0.51 whereas for conventional banks it is 0.53. The test of significance shows that there is no significant difference between average score of cost efficiencies of Islamic and conventional banks.

Graph 1-5. Comparison between Average CE of Conventional and Islamic Banks



In second part of analysis, multiple regression models are applied to estimate the impact of macroeconomic and corporate governance variables on the performance of conventional and Islamic banks. For this purpose, five multiple regression models are constructed which cover two accounting performance indicators, return on equity and return on assets and three efficiency performance indicators such as technical efficiency, allocative efficiency and cost efficiency.

Table 2

Multiple Regression Analysis

	R square	Test Statistics	P-Value	Durban Watson	Standard Error
Model - 1 ROE					
Overall Model	0.62	5.46	(0.01**)	1.03	3.69
Growth Rate		–0.362	–.258 (.72)		0.71
Interest Rate		–1.17	–.647 (0.27)		0.55
Corporate Governance		–3.8	–7.54 (0.00***)		1.97
Model - 2 ROA					
Overall Model	0.24	1.04	0.417	2.37	0.28
Growth Rate		–0.973	–0.053 (0.35)		0.06
Interest Rate		–1.610	–.068 (0.14)		0.04
Corporate Governance		–0.689	–.104 (0.51)		0.15
Model - 3 TE					
Overall Model	0.73	8.85	(0.00***)	1.15	0.08
Growth Rate		1.84	.030 (0.09*)		0.02
Interest Rate		2.78	–.035 (0.02**)		0.01
Corporate Governance		–4.3	–.19 (0.00***)		0.05
Model - 4 AE					
Overall Model	0.38	2.06	(0.17)	2.39	0.15
Growth Rate		0.97	.03 (0.35)		0.03
Interest Rate		2.21	.51 (0.05*)		0.02
Corporate Governance		0.797	.066 (0.44)		0.08
Model - 5 CE					
Overall Model	0.13	0.5	(0.69)	2.69	0.12
Growth Rate		0.878	.021 (.40)		0.02
Interest Rate		1.18	.022 (0.26)		0.02
Corporate Governance		–0.287	–.019 (0.78)		0.07

Note: *Significant at 10 percent level of significance.
**Significant at 5 percent and 10 percent level of significance.
***Significant at 1 percent, 5 percent and 10 percent level of significance.

The results show that the model 1 is highly significant at 1, 5 and 10 percent level of significance. R^2 for model 1 is 0.62 and standard error is 3.69 percent. The coefficients of GDP growth rate and interest rates are –.258 and –.647 respectively and both are insignificant. The coefficient of corporate governance is –7.54 and it is highly significant at 1, 5 and 10 percent level of significance. This means the presence of Shari'a board in governing body of a bank affects the return on equity of the banks.

In model 2, R^2 is 0.24 and standard error is 0.28 percent. The overall model is insignificant. The coefficients of GDP growth rate, interest rate and corporate governance variables are –.05, –.068 and –.104 respectively. All the coefficients of independent variables are insignificant in model 2.

Similarly, the overall model 4 and 5 are also insignificant. The result suggests that there is no impact of macroeconomic and corporate governance on allocative and cost

efficiencies of conventional and Islamic banks. In model 4, the coefficient of interest rate is 0.51 and is significant at 10 percent level of significance.

The results of model 3 suggest that the overall model is highly significant at 1, 5 and 10 percent level of significance. The R^2 and standard error of model 3 are 0.73 and 0.08 respectively. The coefficient of GDP growth rate is 0.03 and significant at 10 percent level of significance. The coefficient of interest rate is –.035 and it is significant at 5 and 10 percent level of significance. While the coefficient of corporate governance variable is –0.19 and it is highly significant at 1, 5 and 10 percent level of significance.

CONCLUSION

When an investor feels himself more secure, he will invest more. For making the firm more profitable, one should protect the rights of the investor. This can only be happen if the firm has strong corporate governance structure. In this case, banking sector in Pakistan was influenced by the government authorities with weak governance which results in a low performing sector, but after making the necessary changes in the governance structure the very sector evident a phenomenon growth and high returns in it. We believe there are still some gaps left in the governance structure of the banking sector in Pakistan, but these gaps will fill up by the Islamic Banks due to their more reliable governance structure.

The results of this study suggest that there is a significant role of corporate governance in the performance of banking sector of Pakistan either it is conventional or Islamic. There is a clear indication that the presence of Shari'a board affects the return on equity and technical efficiency of banking sector. This is a preliminary level effort in this regard. The study can be extended by adding more complex variables of corporate governance and observe their influences on the performance of banking sector in Pakistan.

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Decentralisation of GST Services and Vertical Imbalances in Pakistan

IFFAT ARA and MUHAMMAD SABIR

1. INTRODUCTION

It is generally believed that the 7th National Finance Commission (NFC) Award and 18th Constitutional Amendment have taken a major step towards much needed fiscal decentralisation. While these two delegate more fiscal autonomy and transfers additional resources towards provinces, it seems difficult that tax decentralisation options provided in these two can practically be implemented. This assertion is based on historical tax decentralisation debate in Pakistan, which has made it a very complex issue in management of public finances.

There are arguments both in favour and against tax decentralisation in Pakistan. Its proponents argue that tax decentralisation is an important principle of governance. They generally propose three advantages of fiscal decentralisation including; preference-matching, efficiency through competition, and increased accountability. In particular, a rational assignment of taxing powers helps providing each level of government, a control over its fiscal destiny by allowing it the choice in the level of spending. It helps assuring taxpayers that they are getting what they paid for and consequently may stimulate participation and improve/increase accountability. According to Bahl (1999), fiscal decentralisation assists in revenue mobilisation, innovation in economic activity, accountability of elected officials and grassroots participation in governance. Given this, it is probable that fiscal decentralisation lead towards improved efficiency in the use of resources as the residents in the sub-national governments can decide about their desired mix of public services and revenues that best suits them.

On the other hand, its opponents counter argue that its implementation seems difficult due to various factors like provincial governments do not have capacity to collect taxes, and the bulk of the taxes in Pakistan are usually paid at the headquarters of the firm that may lead to an unfair allocation of revenues after decentralisation. At the same time, the tax administration in Pakistan desires to move from General Sales Tax (GST) to reformed GST in Value Added Tax (VAT) mode in order to increase the tax-to-GDP ratio. Implementation of this would make the tax decentralisation much more complicated as it is difficult to distinguish the sales tax revenues from goods and services

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as a good producing factory also consume many services including telecommunication. Furthermore, as highlighted by Ahmed (2010) the abject performance of FBR and "trust deficit" among provinces and with the federal government add more complications in the practicality of GST reforms.

Despite these contradictory arguments, attempts were made to analyse the scope of sales tax on services by provincial governments to enhance tax-to-GDP ratio in Pakistan. SPDC (1994) is a systematic attempt which provides a comprehensive framework for sales taxation of services by provincial governments. It analysed the constitutional domain for implementing sales tax on services as per 1973 constitution. It also looked at the incidence of indirect taxes on services and concluded that nominal incidence of federal and provincial taxes on services sector was 2.3 percent of their value added. It also laid down a criterion for provincial resource mobilisation through effective implementation of GST on services. The criterion gave higher weightage to under taxation, extent of incidence on richer households, case for integration with national VAT, level of compliance, ease of collection and so on. It also proposed specific taxation proposals for services sector including banking and insurance, wholesale and retail, telecommunication and others. Regardless of such attempts, in 2000, the provincial governments empowered federal government to implement GST services. Since then GST services is being collected by the Federal Board of Revenue (FBR).

At present, in Pakistan financial status of provincial governments largely hinges on federal transfers to the provinces constituted through NFC award rather than on a rational tax assignment. There is an overriding centralisation of revenue collection as over 90 percent of the revenues are collected at the federal level consequently leaving the provinces with very narrow tax bases. From the perspective of sustainable public service provision, the provincial governments require enough "own" revenues rather than heavily relying on federal transfers and grants. GST on services is an ideal option for decentralisation ensured by the 18th Constitutional Amendment and 7th NFC Award.

In this context, this paper is an attempt to analyse the devolution of GST services and vertical imbalance in Pakistan. It determines the scope of GST services in minimising vertical imbalances, if implemented practically. Since, GST services has been initiated in 2000-01, the paper cover the period 2000-01 to 2009-10.

The paper is organised as follows: Section 2 underlines the constitutional provision of revenue assignment; Section 3 presents the pattern of resource mobilisation in Pakistan; Section 4 reveals the extent of vertical imbalance in Pakistan; Section 5 analyses the devolution of GST services and its impact on vertical imbalance; Section 6 discusses the implementation challenges in collecting GST services; and Section 7 concludes the paper.

2. REVENUE ASSIGNMENT AS PER CONSTITUTION

In Pakistan, the constitution and certain statutes designate the revenue assignments between the federal and provincial governments. After the abolishment of concurrent lists in the 18th Amendment, the revenue source assigned to the federal and provincial governments is through an express provision in an article of the constitution or through classification in the federal lists of subjects. In the latter case if the revenue source is mentioned in the Federal List it belongs to the federation only. However, if a revenue source is not mentioned in the Federal List it then belongs to the provinces only.

Federal taxes under the Fourth Schedule, Article 70(4), of the Constitution of Pakistan are given Table 1. It states that among the indirect taxes the federal government has a constitutional right to collect taxes only on the sales and purchases of goods (imported, exported, produced, manufactured or consumed) but not on sales of services. This provides autonomy to the provincial governments to levy sales tax on services.

Table 1

Federal Revenue Assignment as per Constitutional Provision

Federal Taxes	Federal Legislative List
Direct Taxes	
Personal Income Tax (excl. Agricultural Income)	subject 47
Corporate Income Tax	subject 48
Capital Value Tax (excl. Immovable Property)	subject 50
Indirect Taxes	
Duties of Customs (Including Export Duties)	subject 43
Excise Duty (Except on Alcohol, Narcotics)	subject 44
Taxes on the Sales and Purchases of Goods (Except Sales Tax on Services)	subject 49
Mineral Oil, Minerals, Natural Gas	subject 51
Tax on Production Capacity	subject 52
Terminal Taxes on Goods Transport and Passengers	subject 53

The revenue assignment of provincial governments according to the constitutional scheme is given in Table 2. It is to be mentioned that property tax, capital gains, excise duty, sales tax on services, tax on professions, motor vehicle tax are shared revenues under the NFC clauses of the constitution. The base and rate are set by the federation.

Table 2

Provincial Revenue Assignment as per Constitutional Provision

Provincial Taxes	Constitutional Scheme
Direct Taxes	
Property Tax	Residuary but there is bar in the Federal List (subject 51)
Capital Gains	Assigned through bar on the federation in the Federal List (subject 50)
Agriculture Income Tax	Through bar on the federation in the Federal List (subject 47)
Indirect Taxes	
Excise Duty on Alcohol/Liquor/Narcotics	Assigned to province by bar on the federation in the Federal List (subject 44)
Sales Tax on Services	Residuary assignment
Tax on Professions	Article 163 of the constitution
Motor Vehicle Tax	Residuary assignment
Stamp Duty	Residuary assignment
Registration Fee	Residuary assignment
Mutation Fee	Residuary assignment
Natural Gas Excise Duty	Article 161 of the constitution
Net Hydro Profits	Article 161 of the constitution
Electricity Duty	Article 157(2) (b)of the constitution

Thus, according to the constitution of Pakistan, federal government is empowered to levy GST only on the sales, purchase and consumption of goods; however GST on services exclusively falls under the domain of provincial governments.

It was for this very reason that provinces levied sales tax on services on 15th July 2000. Later on, in 2000-01, the provincial governments empowered the federal government to collect GST services on their behalf. Since then federal government has been collecting GST services by breaking it into two modes: GST CE mode and GST provincial. The latter has been transferred to provinces (after deducting the collection charges) on the basis of population rather than collection. CE mode was being treated similar to GST goods before the implementation of 7th NFC Award (July 2010).

Though, collection of sales tax on services already remains a constitutional right of provinces, the 7th NFC Award and the 18th Constitutional Amendment further strengthened this. The document of the 18th Amendment states, *in fourth schedule of the constitution, in the federal legislative list, entry 49 after the word "consumed" the comma and words "except sales tax on services" shall be added.* As a result, GST services CE mode is transferred to provincial governments.

3. RESOURCE MOBILISATION IN PAKISTAN

Before analysing the impact of tax decentralisation on provincial finances, this section presents the pattern of resource mobilisation (generating the required resources to carry out expenditures for public service delivery) in Pakistan by major revenue source both at the federal and provincial levels.

3.1. Resource Mobilisation at Federal Level

Table 3 gives the magnitude and growth in different components of FBR tax revenue in Pakistan. In 2009-10, total tax revenue in Pakistan was Rs 1,380 billion. Of this, 39 percent were the direct taxes and 61 percent were indirect taxes. 16 percent of the indirect taxes were originated via excise duties and 20 percent via import duties while the remaining from GST on goods and services.

Table 3

Components of Federal Tax Revenue

(Rs Million)

Year	Total Tax Revenues	Direct Taxes	Indirect Taxes					
			Total	Excise Duties	Import Duties	GST		
						Total	Goods	Services
2000-01	392,277	124,585	267,692	49,080	65,047	153,565	144,981	8,584
2001-02	404,070	142,505	261,565	47,186	47,818	166,561	154,787	11,774
2002-03	460,627	151,898	308,729	44,754	68,836	195,139	180,991	14,148
2003-04	520,843	165,079	355,764	45,552	91,045	219,167	203,713	15,454
2004-05	590,387	183,372	407,015	53,104	115,374	238,537	214,519	24,018
2005-06	713,442	224,988	488,454	55,272	138,384	294,798	263,767	31,031
2006-07	847,236	333,737	513,499	71,804	132,299	309,396	267,531	41,865
2007-08	1,008,091	387,861	620,230	92,137	150,663	377,430	325,752	51,678
2008-09	1,161,150	443,548	717,602	117,455	148,403	451,744	395,154	56,590
2009-10	1,380,000	540,400	839,600	134,400	164,900	540,300	473,474	66,826
Average Annual Growth Rate (%)								
2001–05	11.29	10.21	11.94	-0.53	16.39	15.67	10.39	30.49
2006–10	17.94	25.19	14.65	25.03	4.77	16.56	16.08	21.49
2001–10	14.91	17.45	13.83	10.15	12.10	16.82	14.31	26.35

Source: Federal Board of Revenue, *Yearbook* (Various Issues).

The trend in growth indicates that tax revenue increased at an average rate of 11 percent per annum during 2001-05 and 18 percent during 2006-10; indicating higher growth in federal taxes in the second half on 2000s. In the first half of 2000s, highest growth was observed in GST services while in second half it was in direct taxes. During the entire period, GST services depicted highest growth that could be due to the fact that it started from a zero base.

Table 4 presents the trend in tax to GDP ratio in Pakistan. It shows that total tax revenue remained on average 9.2 percent per annum of GDP during 2001-05 and increased slightly to 9.5 percent during 2006-10. Direct taxes that on average constituted 3 percent per annum of GDP during 2001-05 increased on average by 0.5 percentage points during 2006-10. Alternatively, indirect taxes declined from an average of 6.2 percent per annum of GDP to 5.9 percent of GDP during these two sub-periods. It is noticeable that contribution of GST on goods in GDP remained on average over 3 percent per annum during these sub-periods while that of GST on services stayed at less than 0.5 percent.[1]

Table 4

Trend in Tax-to-GDP Ratio

(Percent)

Year	Total Tax Revenues	Direct Taxes	Indirect Taxes					
			Total	Excise Duties	Import Duties	GST		
						Total	Goods	Services
2000-01	9.32	2.96	6.36	1.17	1.55	3.65	3.44	0.20
2001-02	9.07	3.20	5.87	1.06	1.07	3.74	3.48	0.26
2002-03	9.45	3.12	6.33	0.92	1.41	4.00	3.71	0.29
2003-04	9.23	2.93	6.31	0.81	1.61	3.89	3.61	0.27
2004-05	9.08	2.82	6.26	0.82	1.78	3.67	3.30	0.37
2005-06	9.36	2.95	6.41	0.73	1.82	3.87	3.46	0.41
2006-07	9.77	3.85	5.92	0.83	1.53	3.57	3.08	0.48
2007-08	9.84	3.79	6.06	0.90	1.47	3.68	3.18	0.50
2008-09	9.11	3.48	5.63	0.92	1.16	3.55	3.10	0.44
2009-10	9.41	3.68	5.72	0.92	1.12	3.68	3.23	0.46
Average Annual Ratios								
2001–05	9.23	3.00	6.23	0.95	1.48	3.79	3.51	0.28
2006–10	9.50	3.55	5.95	0.86	1.42	3.67	3.21	0.46
2001–10	9.36	3.28	6.09	0.91	1.45	3.73	3.36	0.37

Source: Federal Board of Revenue, *Yearbook* (Various Issues).

3.2. Resource Mobilisation at Provincial Level

Table 5 gives the resource mobilisation efforts at provincial level. Compared to Rs 1,380 billion tax collected by the federal government in 2009-10, provincial governments altogether collected only Rs 70 billion. It further indicates that provincial tax revenues increased from a meagre Rs 19.1 billion in 2000-01 to Rs 70 billion in 2009-10. On the other hand, non-tax revenues increased from Rs 19.9 billion to Rs 95 billion during same period.

[1]See Martinez-Vanquez (2006) and Thirk (2008) for analysis of taxation and policies in Pakistan.

Table 5

Provincial Revenues

(Rs Million)

Year	Tax	Non-Tax	Total
2000-01	19,100	19,900	39,000
2001-02	18,800	21,300	40,100
2002-03	21,800	25,400	47,200
2003-04	28,000	25,000	53,000
2004-05	34,710	22,404	57,114
2005-06	36,800	47,600	84,400
2006-07	36,819	45,408	82,227
2007-08	40,794	77,987	118,781
2008-09	46,084	83,789	129,873
2009-10	70,000	95,000	165,000
Average Annual Growth Rates (%)			
2001–05	13.68	7.59	10.46
2006–10	16.35	40.08	25.21
2000–10	15.01	23.84	17.84

Source: GoP, *Economic Survey*.

Relative to taxes, higher growth in non-tax revenues indicates that provincial revenues are tilted towards non-tax revenue. Further, over the entire period, provincial taxes grew at a pace similar to federal taxes suggesting that capacity of provincial governments in collecting taxes is not as bad as it usually argued.

4. VERTICAL FISCAL IMBALANCE IN PAKISTAN

Vertical fiscal imbalance means the disparity between the revenues of a government and its expenditure responsibilities. An adequate provision of social services is a concurrent function of federal and provincial governments. However, the combination of decentralised spending with centralised financing through grants and tax revenue sharing leads to vertical fiscal imbalance. This situation prevails in Pakistan where the financing and delivery of social services largely lie in the hands of provinces and major sources of revenues in the hand of federal government creating vertical imbalances.

Table 6 shows the total tax and non-tax revenue collected by the federal and provincial governments. Noticeably, the table reveals that the federal government collects 92 percent to 94 percent of the revenue in Pakistan. Only 6 percent to 8 percent of the revenues are collected by the provincial governments. This suggests that provincial governments have a very narrow base of revenue collection.

Table 6

Revenue Collection of Federal and Provincial Governments

	Total Revenues (Rs Million)			Share in Revenues (%)	
Year	Federal	Provincial	Total	Federal	Provincial
2000-01	514,000	39,000	553,000	92.9	7.1
2001-02	584,000	40,100	624,100	93.6	6.4
2002-03	673,600	47,200	720,800	93.5	6.5
2003-04	741,000	53,000	794,000	93.3	6.7
2004-05	842,900	57,114	900,014	93.7	6.3
2005-06	992,200	84,400	1,076,600	92.2	7.8
2006-07	1,215,730	82,227	1,297,957	93.7	6.3
2007-08	1,380,599	118,781	1,499,380	92.1	7.9
2008-09	1,721,028	129,873	1,850,901	93.0	7.0
2009-10	1,990,387	165,000	2,155,387	92.3	7.7

Source: GoP, *Economic Survey* (Various Issues).

Table 7 gives only the total tax collection of federal and provincial governments. It further strengthens the point that provinces have limited control in collection of taxes in Pakistan. In most of the years since 2000-01, provincial governments collected only 4 percent of the total taxes in the country.

Table 7

Tax Collection of Federal and Provincial Governments

	Total Taxes (Rs Million)			Share in Taxes (%)	
Year	Federal	Provincial	Total	Federal	Provincial
1999-00	386,800	18,800	405,600	95.4	4.6
2000-01	422,500	19,100	441,600	95.7	4.3
2001-02	459,300	18,800	478,100	96.1	3.9
2002-03	534,000	21,800	555,800	96.1	3.9
2003-04	583,000	28,000	611,000	95.4	4.6
2004-05	624,700	34,710	659,410	94.7	5.3
2005-06	766,900	36,800	803,700	95.4	4.6
2006-07	852,866	36,819	889,685	95.9	4.1
2007-08	1,009,902	40,794	1,050,696	96.1	3.9
2008-09	1,158,586	46,084	1,204,670	96.2	3.8
2009-10	1,523,497	70,000	1,593,497	95.6	4.4

Source: GoP, *Economic Survey* (Various Issues).

On the other hand, the current expenditures of the federal and provincial government given in Table 8 indicate that the share of provinces in total current expenditure is far high. Provinces spend 23 percent to 29 percent of the total current expenditure in Pakistan. It needs to mention that the share of provinces would go up if these expenditures include the amount of development expenditures.

Table 8

Current Expenditures of Federal and Provincial Governments

	Total Current Expenditure (Rs Million)			Share (%)	
Year	Federal	Provincial	Total	Federal	Provincial
1999-00	477,900	148,500	626,400	76.3	23.7
2000-01	479,000	166,700	645,700	74.2	25.8
2001-02	524,600	175,600	700,200	74.9	25.1
2002-03	599,800	191,900	791,700	75.8	24.2
2003-04	557,000	218,000	775,000	71.9	28.1
2004-05	664,200	200,300	864,500	76.8	23.2
2005-06	789,100	245,600	1,034,700	76.3	23.7
2006-07	973,130	402,215	1,375,345	70.8	29.2
2007-08	1,416,015	437,132	1,853,147	76.4	23.6
2008-09	1,495,873	545,697	2,041,570	73.3	26.7
2009-10	1,670,963	590,000	2,260,963	73.9	26.1

Source: GoP, *Economic Survey* (Various Issues).

Thus, while provincial share in tax revenue on average is less than 5 percent during the 2000s their share in expenditure is over 25 percent indicating the extent of vertical imbalance in Pakistan. This builds the argument that provinces to a large extent depend on the resources or transfers from the federal government to meet their expenditures demand. Accordingly, in Pakistan, 88 percent of the provincial government's resources depend on intergovernmental transfers. In contrast, in other developing countries, like India and Malaysia, 35 percent of the provincial government's resources come from intergovernmental transfers.

5. DEVOLUTION OF GST SERVICES AND VERTICAL IMBALANCE

Having developed that there are significant vertical imbalances in Pakistan, it is important to analyse whether or not devolution of GST services will make any sizeable impact. As Khan (2009) highlights that services sector constitutes more than half of the value added of the economy, but it is fetching only 34 percent of the federal tax receipts. While mentioning the difficulties in taxing services, he points out that many services are rendered at the distribution process or at the stage of production, which sometime have informal characteristics, hence making it difficult to collect taxes from them. Given the narrow base of services and difficulties attached to collecting taxes from them, this section first highlights the contribution of GST in overall FBR taxes and then looks whether GST services has sizeable tax base. As per scope of the study, it excludes other taxation on services sector such as Federal Excise Duty (FED), income tax and the like. It also compares effective tax rate of GST services with other taxes to highlight the tax potential in GST services. Afterwards, it compares the vertical imbalances in revenue transfer to the provincial governments with or without GST services.

5.1. Contribution of GST Services in FBR Taxes

Table 9 gives the contribution of GST on services in comparison with GST on goods under different tax heads. For instance, in total GST, services contributed on average only 7.4 percent per annum during 2001-05, which increases to 12.6 percent during 2005-10. GST services contributed on average 4.5 percent per annum in total indirect taxes and 3 percent per annum in total tax revenue during 2001-05. These shares increased to 7.7 percent and 4.8 percent respectively during 2006-10. While in comparison with GST goods these shares are still very low, they showed relatively higher growth.

Table 9

Contribution of GST on Goods and Services

(Percent)

	GST on Goods as Proportion of Total			GST on Services as Proportion of Total		
Year	GST	Indirect Tax	Tax Revenue	GST	Indirect Tax	Tax Revenue
2000-01	94.41	54.16	36.96	5.59	3.21	2.19
2001-02	92.93	59.18	38.31	7.07	4.50	2.91
2002-03	92.75	58.62	39.29	7.25	4.58	3.07
2003-04	92.95	57.26	39.11	7.05	4.34	2.97
2004-05	89.93	52.71	36.34	10.07	5.90	4.07
2005-06	89.47	54.00	36.97	10.53	6.35	4.35
2006-07	86.47	52.10	31.58	13.53	8.15	4.94
2007-08	86.31	52.52	32.31	13.69	8.33	5.13
2008-09	87.47	55.07	34.03	12.53	7.89	4.87
2009-10	87.63	56.39	34.31	12.37	7.96	4.84
			Average Annual Shares			
2001–05	92.59	56.39	38.00	7.41	4.51	3.04
2006–10	87.47	54.02	33.84	12.53	7.74	4.83

Source: Federal Board of Revenue, *Yearbook* (Various Issues).

5.2. Tax Base of GST Services

Table 10 shows the ratios of GST goods and GST services base to GDP. While base-to-GDP ratio of GST goods substantially increased, base-to-GST ratio of services hovered around over 20 percent during the two sub-periods. This happened because FBR focused only on the efficiency of GST services collection till 2008-09, without broadening its tax base. However in 2009-10, new services like banking insurances and other were also added to broaden its base.

Table 10

GST Base-to-GDP Ratio

(Percent)

Year	Total GST	GST Goods	GST Services
2000-01	48.41	27.81	20.60
2001-02	47.56	26.47	21.08
2002-03	48.27	26.96	21.31
2003-04	50.95	30.58	20.37
2004-05	54.35	34.18	20.17
2005-06	57.78	37.29	20.49
2006-07	56.84	36.41	20.44
2007-08	59.53	39.12	20.41
2008-09	56.03	33.59	22.44
2009-10	54.45	31.56	22.89
	Average Annual Ratio		
2001–05	49.9	29.2	20.7
2006–10	56.9	35.6	21.3

5.3. Effective Tax Rates

Table 11 portrays the effective tax rate of different components of tax revenues in Pakistan. It indicates that effective tax rate of GST services hanged on average only about 1.4 percent and 2 percent per annum respectively during the two sub-periods. GST on goods though declined from an average of 12 percent per annum during 2001-05 to nearly 9 percent during 2006-10 but remained far above than that of GST on services. GST services have lowest rates because of lower efficiency of tax collection and tax exemptions. This lowest effective tax rate indicates greater potential of GST in services sector.

Table 11

Effective Tax Rate

(Percent)

		Indirect Taxes			
	Direct	Excise	Imports	GST	
Year	Taxes	Duty	Duty	Goods	Services
2000-01	4.18	4.72	17.77	12.38	0.99
2001-02	4.48	4.25	11.95	13.13	1.25
2002-03	4.37	3.62	14.83	13.77	1.36
2003-04	4.04	3.11	14.25	11.81	1.35
2004-05	3.81	2.93	13.30	9.65	1.83
2005-06	3.95	2.43	12.05	9.28	1.99
2006-07	5.10	2.75	10.49	8.47	2.36
2007-08	4.91	2.90	9.92	8.13	2.47
2008-09	4.68	3.13	8.89	9.23	1.98
2009-10	4.99	3.15	9.57	10.23	1.99
		Average Annual Rate			
2001–05	4.18	3.73	14.42	12.15	1.36
2006–10	4.72	2.87	10.19	9.07	2.16

Though, it is apparent there exist potential of taxation in the services sector but the idea here is to observe how far the vertical imbalance be reduced once the provinces are empowered to collect GST services.

5.4. Share of Provincial Revenues with or without GST Services

Table 12 displays the share of provincial tax revenues in total taxes with and without GST services. It indicates that had the GST services been devolved in 2000-01 and had it acquired the same efficiency then provincial share of taxes would have increased from 4.3 percent to 6.3 percent in 2000-01. And, with the passage of time this share would have further increased to 8.6 percent in 2009-10. Thus, with full provincial share of GST services, provincial share in taxes would have more than doubled during 2006-10.

Table 12

Provincial Revenues With or Without GST Services

(Percent)

	Provincial Share in Revenues			Provincial Share in Taxes		
Year	Without GST Services	With GST Services	Difference	Without GST Services	With GST Services	Difference
2000-01	7.1	8.6	1.6	4.3	6.3	1.9
2001-02	6.4	8.3	1.9	3.9	6.4	2.5
2002-03	6.5	8.5	2.0	3.9	6.5	2.5
2003-04	6.7	8.6	1.9	4.6	7.1	2.5
2004-05	6.3	9.0	2.7	5.3	8.9	3.6
2005-06	7.8	10.7	2.9	4.6	8.4	3.9
2006-07	6.3	9.6	3.2	4.1	8.8	4.7
2007-08	7.9	11.4	3.4	3.9	8.8	4.9
2008-09	7.0	10.1	3.1	3.8	8.5	4.7
2009-10	7.7	10.8	3.1	4.4	8.6	4.2
			Average Annual Shares			
2001–05	6.6	8.6	2.0	4.4	7.0	2.6
2006–10	7.3	10.5	3.1	4.2	8.6	4.5

Source: Authors' estimates based on *FBR Yearbook*.

5.5. Role of GST Services in Minimising Vertical Imbalances

Table 13 shows vertical imbalances in Pakistan with or without devolving GST services during 2006-07 to 2009-10. It indicates that if GST services were successfully devolved then vertical imbalance would have been reduced. For instance, in 2006-07 vertical imbalance would have been reduced from 27.2 percent to 23.9 percent due to decentralisation of GST services. Similarly in 2009-10, vertical imbalance would have been reduced from 24.3 percent to 21.2 percent due to decentralisation of GST services.

Table 13

Vertical Imbalances in Pakistan

(Percent)

Year	Without GST Services			With GST Services		
	Revenue Share	Expenditure Share	Surplus / Deficit	Revenue Share	Expenditure Share	Surplus / Deficit
2006-07						
Federal	93.7	66.5	27.2	90.4	66.5	23.9
Provincial	6.3	33.5	–27.2	9.6	33.5	–23.9
2007-08						
Federal	92.1	73.6	18.4	88.6	73.6	15.0
Provincial	7.9	26.4	–18.4	11.4	26.4	–15.0
2008-09						
Federal	93.0	70.4	22.6	89.9	70.4	19.6
Provincial	7.0	29.6	–22.6	10.1	29.6	–19.6
2009-10						
Federal	92.3	68.0	24.3	89.2	68.0	21.2
Provincial	7.7	32.0	–24.3	10.8	32.0	–21.2

Source: Authors' estimates based on *FBR Yearbook*.

6. IMPLEMENTATION CHALLENGES

Despite the fact that devolving GST service has constitutional provision and it also reduces the vertical imbalances, this has not yet been put into practice. There are certain challenges that often come in its implementation debate. These can be sum-up in following three arguments.

- Provincial governments do not have the capacity to collect GST on services.
- Under VAT regime, collection of goods and services cannot be separated.
- Bulk of the taxes in Pakistan are paid at the headquarters of the firm that may lead to an unfair allocation of revenues after decentralisation.

This section systematically discusses the validity of these arguments by analysing the structure of GST services. Table 14 presents the GST collected on services by sectors in 2009-10. The statistics reveal that GST on services is largely collected from telecommunication sector, which contributed more than 70 percent of total GST on services. Historically, the share of telecommunication in GST services was more than 90 percent. The other major tax spinners are banking and insurance (tax collected under federal excise duty), community and social services, and transport and communication services.

Table 14

General Sales Tax on Services—2009-10

Sector	Tax Collection (Rs Million)	Share (%)
Telecommunications	44,852.5	70.4
Banking and Insurance	5,969.8	9.4
Community and Social Services	5,368.9	8.4
Transport and Communication	4,453.2	7.0
Hotels, Recreation and Entertainment	2,347.7	3.7
Wholesale and Retail Trade	468.8	0.7
Other	222.6	0.3
Total	63,683.5	100.0

Source: Federal Board of Revenue.
Note: Banking and Insurance largely includes federal excise duty.

6.1. Devolution of GST on Telecommunications

There are several apprehensions regarding the devolution of GST on telecommunication services. For example, does it require lots of capacity that provincial government do not have at present? Will it lead to an unfair allocation among provinces? Is it impossible under VAT regime?

As per our understanding, the answer to all these questions is in negative. Firstly, there are fewer telecommunication companies to deal with. They have computerised record and have complete information about usage of their services, charging of bills and payment of taxes. As a result, devolution of telecommunication taxes does not require much capacity and provincial governments can easily collect tax with these fewer computerised telecommunication companies. Their computerised records also help minimising the scope of unfair allocation among the provinces. However, devolution of GST on telecommunication under VAT mode is relatively a difficult task. Attempts have been made at the federal and provincial (Sindh) government level to resolve this issue. Their technical teams concluded, "while VAT regime requires 'input-output adjustment' to be centralised, collection can be decentralised." For instance, as per 2009-10 estimate provinces can collect Rs 45 billion in GST from telecommunications services. Since bulk of this tax is collected from end users with limited scope for input output adjustment, however, companies seeking refunds submit consolidated (goods and services) account/claim to FBR. As per FBR estimates these refunds hardly reached to Rs 3.5 billion. After receiving and verifying these refund claims FBR can provide refunds (Rs 3.5 billion) to companies and provinces can reimburse FBR the amount equivalent to refund claims i.e. Rs 3.5 billion.

6.2. Devolution of GST on Banking and Insurance

Banking and insurance sector is the second biggest contributor in services tax. At present, the services of this sector are taxed under FED mode and not under GST. Nevertheless, after the 7th NFC Award, it is likely that this collection can be treated as GST. This sector also has smaller number of banking and insurance companies, mostly in

formal sector, having computerised records. Given this, the provincial governments do not require much capacity and can easily deal with them. Moreover, complete computerised transaction details also minimise the scope of unfair allocations of GST among the provinces. Similar to telecommunication sector, the input output adjustment can be dealt by federal government; however, the collection can be devolved.

6.3. Devolution of GST on Other Sectors

In contrast to telecommunication and banking and insurance, other sectors have large number of tax payers. The provincial governments need to build capacity in order to collect GST from them. In this regard, recently an attempt has been made by the government of Sindh where it established a board named Sindh Revenue Services (SRS). It has an independent board of directors and separate collection mechanism. Currently, the progress of SRS working is slow as the decision to devolved GST services is in pending.

Certain confusions also prevail regarding the collection of GST services. For example, there is confusion that if more than one person was involved in consuming a service like telecommunication then who will pay the tax. And if they live in different provinces then which province would receive the revenue from GST services. Theoretically, this argument seems very difficult but in reality this can be addressed very easily. For example, every telecommunication company charges a fee on its services. While two persons are consuming same service the bill is generally paid by one person. Since GST service is a proportional tax on billing amount, it would be collected by the province whose consumer bears the charges of bill and hence that province will receive the revenue. The same logic can be followed if more than one consumer pays the billing amount and taxes, whether in a pre- or post-paid manner.

Another confusion is whether or nor GST service is a part of divisible pool. Prior to the 7th NFC Award, GST on services CE mode was part of the divisible pool and GST provincial tax was treated as straight transfers. After the 7th NFC Award, both GST provincial and CE mode would be treated as straight transfers and hence GST services would no more be part of divisible pool.

7. CONCLUSION

In Pakistan, confinement of major sources of revenues with the federal government and a sizeable expenditures assignment at provincial level creates vertical fiscal imbalances. While these vertical imbalances are generally addressees through intergovernmental transfers, there is still a need to devolve taxes at provincial levels. The 7th NFC Award and 18th Constitutional Amendment ensure that a GST services is a provincial tax. In this context, this paper analyses the scope of GST services in minimising the vertical fiscal imbalances in Pakistan. The analysis indicates that devolution of GST services will help doubling the share of provincial tax revenues in total taxes thus facilitate reducing vertical imbalances in Pakistan. Moreover, the telecommunication sector, which pays bulk of the GST services, requires limited provincial capacities for collection of GST as there are fewer telecommunication companies in Pakistan and all have computerised database.

Though, the devolution of GST services will reduce the vertical imbalance but it will not eliminate it completely. Future NFCs would therefore be needed to address the issues of reaming vertical and horizontal imbalances.

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The Effects of Fiscal Policy on Economic Growth: Empirical Evidences Based on Time Series Data from Pakistan

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1. INTRODUCTION

Fiscal policy refers to government's efforts to influence the direction of the economy through changes in taxes or expenditures. Optimal fiscal policy in Pakistan and in other developing countries plays a pivotal role in growth process and, hence, serves as a vital instrument for economic growth. The efficacy of fiscal policy in improving economic conditions in the long run is, however, a controversial issue and needs further investigation.

In conventional model, a federal tax cut without a corresponding reduction in federal expenditures will encourage consumption expenditures and interest earnings due to increase in personal disposable income. Contrarily, according to Ricardian Equivalence Theorem (RET), the same change in fiscal policy will not result in any of the above mentioned macroeconomic impacts. In other words, a reduction in deficit-financed federal tax cut will not affect macroeconomic outcomes [Saxton (1999)].

The empirical literature on the effects of fiscal policy on Pakistan's economic growth is still at its infancy, we surmise. Shabbir and Mahmood (1992), Iqbal (1995, 1994, 1998), Khilji and Mahmood (1997) have concluded that fiscal deficit is one of the significant variables that affects economic growth in Pakistan. Haq (2003), on the other hand, has argued that fiscal deficits do not have any effect on key macroeconomic indicators such as investment, inflation and GDP growth. The impact of fiscal policy on economic growth can also be demonstrated and explored through transmission mechanism; it affects economic growth via demand and supply sides. According to Khalid, *et al.* (2008) fiscal policy is considered to have dynamic transmission mechanism, as it carries longer policy lags for different macroeconomic variables and hence, it has different impacts on key macroeconomic variables.

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Recognising the importance of sound fiscal policy, the present study explores the link between fiscal policy and economic growth for Pakistan's economy for the period 1972–2008. The study also examines the effectiveness of fiscal policy in different political regimes. Using dynamic model and various econometric techniques, this study tests the significance of various empirical models. The study also imparts some policy recommendations for the development of sound fiscal policy in Pakistan. This study is the first empirical analysis on the "effectiveness of fiscal policy and its impact on economic growth" in Pakistan.

The rest of this study is organised as follow: Section 2 presents the summary of review of literature on the effects of fiscal policy on economic growth in different parts of the world. Section 3 presents the model specification and methodology. Section 4 represents the empirical findings and the last section provides concluding remarks and policy implications.

2. LITERATURE REVIEW

> "The macroeconomic relationship between fiscal policy and economic growth has long fascinated economists. Unfortunately, analyses of that relationship have frustrated empiricists for almost as long. One root of that frustration is the array of possible policy indicators" [Fu, *et al.* (2003)].

A large number of studies have been carried out to examine the impact of fiscal policy variables on economic growth, investment, consumption, inflation, exchange rate, external deficit and other macroeconomic activities [Landau (1986); Höoppner (2003); Perotti (2005), Amanja and Morrissey (2005); Falk, *et al.* (2006); Rezk (2006); Castro, *et al*. (2006); Fatas and Mihov (1998); Sinha (1998); William and Orszag (2003); Claus, *et al*. (2006) and Kukk (2006)]. Government spending, tax revenues and budget deficits as fiscal policy variables have been used by these authors and found different responses of macroeconomic activities to fiscal innovations. According to Höoppner (2003), Claus, *et al*. (2006), Esau (2006), Heppke-Falk, *et al.* (2006) and Castro, *et al*. (2006), shocks to government spending positively affect GDP growth rate, whereas shocks to taxes inversely affect GDP growth rate. Furthermore, GDP growth rate responds negatively to budget deficit in the long run [Balassa (1988); Iqbal and Zahid (1998); Jafri, *et al*. (2006)]. Many researchers [Barro and Sala-i-Martin (1995); Sala-i-Martin (1997); Mendoza, *et al*. (1997); Tanzi and Zee (1997); Kneller and Gemmell (1999); Odedokun (2001); and Bose, *et al.* (2003); Amanja and Morrissey (2005); Romero de Avila and Strauch (2007)] have used fiscal policy variables in the growth equations and have found their significant contribution. The rising budget deficit has been considered as one of the main constraints to economic growth [Iqbal and Zahid (1998); Fischer (1993); Easterly and Rebelo (1992); Levine and Zervos (1993); Barro (1991); Mwebaze (2002) and Balassa (1988)]. From the relevant literature it is clear that fiscal policy affects economic growth. However, the sign and magnitude of the effects of different tools of fiscal policy are ambiguous.

Only few studies have examined the effects of fiscal policy on specific macroeconomic variables in Pakistan [Ahmad and Qayyum (2008); Haque and Montiel (1991); Khalid, *et al*. (2008)]. Few studies have included budget deficit in growth equations and have found that budget deficit is one the significant variables affecting

economic growth [Shabbir and Mahmood (1992); Iqbal (1994, 1995, 1998); Khilji and Mahmood (1997)]. As far as theoretical work regarding the relationship between fiscal policy and economic growth is concerned, the most notable work has been done by Trevala (2005) and Blinder and Solow (1972). Tervala (2005) argued that fiscal growth raises the output of non traded goods and crowds out private consumption of non traded goods. However, Blinder and Solow (1972) argued that in the simplified IS–LM framework the long run sign of the pure fiscal multiplier is undermined a priori, fiscal policy only acts perversely in unstable system.

3. MODEL SPECIFICATION, DATA AND METHODOLOGY

3.1. Model Specification and Data

In order to examine the effects of fiscal policy on economic growth, we estimate the following equation.

$$Y_t = \lambda_o + \lambda_1 FP_t + \lambda_2 X_t + \lambda_3 (FP*DUM)_t + \mu \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Where Y = Growth rate of GDP per capita, vector X represents the set of control variables i.e., private investment (PINV), inflation (INF), current account deficit (CAD) and FP represents Fiscal Policy variables. In the above equation changes in FP variables has a dynamic impact on Y. Further, to capture the effects of fiscal policy in democratic and military regimes, we include the interaction term of fiscal policy with political dummy. We use overall fiscal deficit as a proxy of fiscal policy.

The data for this study consist of annual observations for the period 1972–2008. The most important data source is Economic Survey of Pakistan (Government of Pakistan). A multivariate framework is employed in this study.[1]

3.2. Methodology

This study concentrates on the ADF and PP and Ng–Perron unit root tests. To test the long run relationship, this study uses the robust econometric technique, Autoregressive Distributed Lag model (ARDL), popularised by Pesaran and Shin (1998), and Pesaran, *et al*. (2001).

The error correction version of ARDL model is given below for the above given Equation (1).

$$\Delta Y_t = \alpha + \beta_1 \sum_{i=1}^{p} \Delta Y_{t-i} + \beta_2 \sum_{i=0}^{p} \Delta FP_{t-i} + \beta_3 \sum_{i=0}^{p} \Delta X_{t-i} + \lambda_1 Y_{t-1} + \lambda_2 FP_{t-1} + \lambda_3 X_{t-1} + \mu \quad \ldots \quad (2)$$

Where Y represents real GDP growth rate, FP represent fiscal policy variables such as fiscal deficit as a percent of GDP (FD), current expenditures as a percent of total expenditures (CE) and development expenditures as a percent of total expenditures (DE). X represents control variables. β_0 is drift component and μ is white noise.

In order to find out the short run coefficients, we use the following equation:

$$\Delta Y_t = \alpha + \beta_1 \sum_{i=1}^{p} \Delta Y_{t-i} + \beta_2 \sum_{i=0}^{p} \Delta FP_{t-i} + \beta_3 \sum_{i=0}^{p} \Delta X_{t-i} + \eta EC_{t-I} \quad \ldots \quad \ldots \quad (3)$$

[1]See Appendix 1 for the definitions of variables.

η is the error correction term in the model indicates the pace of adjustment reverse to long run equilibrium following a short run shock.

Private investment is measured by the sum of business fixed investment, residential investment and inventory investment. Moreover, current account balance is measured by the sum of net exports of goods and services, net income from abroad (Net Factor Payment) and net unilateral transfers.

Samudram and Vaithilingam (2009) in case of Malaysia and Mohammadi, *et al*. (2008) in case of Turkey used Autoregressive Distributed Lag model (ARDL) to examine the impact of public expenditure on economic growth.

To cope up with the endogeneity of explanatory variables, and to avoid inconsistent results, this study uses two-stage least Square (2SLS) instrumental variable techniques.

4. EMPIRICAL RESULTS OF GROWTH EQUATION

4.1. Testing of the Unit Root Hypothesis

ADF test, PP test and Ng–Perron unit root test were applied in order to test the unit root hypothesis to all variables. A summary of these test results is reported in Table 1.

Table 1

Unit Root results

	ADF (Drift and Trend)		P- P (Drift and Trend)	
Variables	Level	1st Diff	Level	1st Diff
Y	–0.56	–4.24**	–0.09	–4.87*
FD	–1.84	–7.91*	–1.84	–7.91
PINV	–6.06*	–3.92***	–1.41	–10.30*
PCON	–1.52	–4.88*	–1.61	–7.23*
INF	–0.72	–4.67**	–1.41	–4.89*
CAD	–4.14*	–6.67*	–5.98*	13.09*

Notes: *(**) Shows significance at 1 percent (5 percent) level.

Results show that each of the variables is integrated of different order. The results of the unit root tests enable us to apply any cointegration technique. The results of ADF and PP unit root tests show that all variables are integrated of order one except PINV and CAD. The results of Ng-Perron unit toot test show that all variables are integrated of order one except CAD. The results of Ng-Perron unit root test are given in Table 2.

Table 2

Ng-Perron Unit Root Results

Ng-Perron Test Statistics				
	At Level			
	MZa	MZt	MSB	MPT
Y	–0.62	–0.23	0.37	37.15
FD	–36.0	–134.29	0.01	0.01
PINV	–9.69	–2.12	0.21	9.71
PCON	–1.79	–0.49	0.27	24.08
INF	–1.86	–0.84	0.45	40.55
CAD	–17.96**	–2.99	0.16	5.07
	At 1st Difference			
	MZa	MZt	MSB	MPT
Y	–17.61*	–2.96	0.16	5.19
FD	–3.76*	–39.11	10.37	3.10
PINV	–12.13***	–2.46	0.20	7.51
PCON	–15.03***	–2.719	0.18	6.18
INF	–55.82*	–4.80	0.08	3.77
CAD	–13.39**	–2.58	0.19	6.80

Notes: *(**) Shows significance at 1 percent (5 percent) level.

To choose a robust model for estimation of growth equation, we estimate different growth equations and select three of them for comparison. These equations have been estimated via ARDL co-integration technique.

4.2. Lag Selection of ARDL

After finding integrating order of all variable, the ARDL co-integration system is implemented for Pakistan utilising annual data over the period 1972–2008. In the first stage, the order of lag length is usually obtained from unrestricted vector autoregressive (VAR) via Schwartz Bayesian Criteria (SBC) and Akaike Information Criteria (AIC). The order of lag length is "2" which is selected through the minimum value of SBC as shown in Table 3.

Table 3

Lags Defined through VAR-SBC for Overall Model

Lag Selected through VAR-SBC	
Lag	Growth Equation
0	104.69
1	91.73
2	90.33*
3	90.55

Notes: *Indicates minimum Schwarz SBC at the corresponding lag.

Therefore, lag order 2 is selected on lowest value of SBC in Table 3 for the growth equation. In the next step, we determine individual lag order for the estimation of ARDL, which is (2, 2, 2, 2, and 0). Finally, the F-test Statistics is estimated on the basis of Wald-test. The results are given in the following Table 4.

Table 4

Lag Length Selection and Bound Testing for Cointegration

Modal 1 (Growth Equation)				
Order of the lags	AIC	HQ	SBC	F-test Statistics
K = 1	116.65	118.57	117.28	2.31
K = 2	113.98*	117.55*	115.17*	5.75**
Short run Diagnostic Tests				
Serial Correlation LM tests = 1.65 (0.32)				
ARCH Tests: 1.54 (0.24)				
White Hetroscedasticity Test: 0.76 (0.34)				
Ramsey RESET = 1.02 (0.87)				
Jarque-Bera Tests= 897.45 (0.00)				

*(**) Significant at 10 percent (5 percent) level of significant according to Pesaran, *et al.* (2001) and Narayan (2005).

The results of bound testing approach show that calculated F statistics is statistically significant for growth equation and higher than upper bound critical value at 5 percent level of significance implying that there is a co-integration among the variables in the models. The stability of long run relationship among the variables in the model is also clear from the cumulative sum (CUSUM) stability test.[2] Having found a long run relationship, we apply the ARDL method to estimate the long run and short run coefficients.[3] Long run results are shown in Table 5.

Table 5

Estimated Long Run Coefficients Using the ARDL[4]

Dependent Variable Real GDP Growth Rate (Y)	ARDL Technique Order (2, 2, 2, 2, 0)	
Regressors	Coefficients	Coefficients
FD	–1.64*	1.04*
PINV	0.26 *	0.19*
INF	–0.05**	–0.06***
CAD	–0.83*	–0.91*
FD^2	–	–0.04*
FD *DUM	–0.51***	–
	R^2 = 0.99	R^2 = 0.99
	Adjusted R^2 = 0.99	Adjusted R^2 = 0.99
	F-statistics = 1298.2	F-statistics = 1576.2
	Dh Stat = 2.14	Dh Stat = 1.81

Note: *, ** and*** represent Significant at 1 percent, 5 percent and 10 percent level of significance.

[2]The results of CUSUM are given in Appendix 3.

[3]For details see Pesran, *et al*. (2001).

[4]ARDL order is (2, 2, 2, 2, 0) selected based on SBC.

We use fiscal deficit as a percent of GDP (FD), Private investment as a percent of GDP (PINV), inflation rate (INF), current account deficit as a percent of GDP (CAD) as explanatory variables in growth equation. An interaction term of fiscal deficit with dummy of democracy is also included in the growth equation.

ARDL technique provides best results in the presence of endogeneity.[5] The explanatory variables and their lags are used as instruments. It is clear from Table 5 that all variables have expected signs and parameters are significant. The long run results suggest that all variables are important factors affecting economic growth. The coefficient of fiscal deficit is negative and significant at 1 percent level of significance indicating that expansionary fiscal contraction occurs in Pakistan. In the long run rising fiscal deficit reduces national savings and slows down economic growth. These results support the findings of other studies, which evidenced that fiscal deficit negatively affects economic growth [Balassa (1988); Barro (1991); Easterly and Rebelo (1992); Levine and Zervos (1993); Fischer (1993); Barro and Sala-i-Martin (1995); Mendoza, *et al*. (1997); Tanzi and Zee (1997); Kneller and Gemmell (1999); Odedokun (2001); Mwebaze (2002); Bose, *et al*. (2003); Ali (2005); Amanja and Morrissey (2005); Jafari, *et al*. (2006); Kukk (2006); Romero de Avila and Strauch (2007)]. The results of this study also support the findings of the studies in Pakistan [Shabbir and Mahmood (1992); Iqbal (1994, 1995); Khilji and Mahmood (1997); Iqbal and Zahid (1998)]. The main reason of expansionary fiscal contraction in Pakistan is that government activities are mostly politically motivated and unproductive and therefore restrains growth. Moreover, the huge fiscal deficit is due to non development expenditures. Only interest payment of public debt and defence expenditures exceed the development expenditures. Due to these reasons fiscal deficit negatively affects economic growth in the long run. The coefficient of Private investment is significant and its positive sign indicates that high level of investment increases the productivity and, hence, accelerates economic growth. The results show that inflation negatively affects economic growth. This is due to the fact that inflation decreases domestic demand and increases the cost of production. These factors decelerate economic growth. Another important inference drawn from the above result is that the sign of interaction term is negative and significant indicating that fiscal deficit is negatively affecting economic growth in military regime. The sign of current account balance is negative and significant at 1 percent level of significance; it indicates that an increase in current account deficit decreases the foreign exchange reserves with host country and hence, reduces economic growth. The coefficient of fiscal deficit is positive when the square term of fiscal deficit is introduced in the model. The square term with negative coefficient is the indication of fiscal deficit Laffer curve in case of Pakistan. It means that fiscal deficit is not a problem up to some threshold level.

[5]To check the robustness of the model, we provide the results of 2SLS in Appendix 2. From the results of both techniques (ARDL and 2SLS) it is clear that the parameters of the model are not sensitive to change in econometric technique and hence, it shows the robustness of the model.

Table 6

Estimated Short Run Coefficients Using the ECM

Dependent Variable Change in Real GDP Growth Rate (ΔY) Regressors	ARDL Technique Order (2, 2, 2, 2, 0) Coefficients
ΔFD	–0.28**
ΔPINV	0.17***
ΔINF	0.08*
ΔCAD	0.98
ΔFD*DUM	–0.56
EC_{t-1}	–0.43*
	$R^2 = 0.81$
	R^2 adjusted = 0.79

Note: *, ** and*** represent Significant at 1 percent, 5 percent and 10 percent level of significance.

The estimated lagged error correction term EC (–1) is negative and highly significant. The negative and significant error correction term also indicates that there is a long run relationship among the variables Y, FD, PINV, INF and CAD. The feedback coefficient is –0.43. It suggests that about 43 percent disequilibrium is corrected in the current year. The result also suggests that in the short run fiscal deficit has significant impact on economic growth. In the short run, increase in fiscal deficit leads to a decrease in the real gross domestic product. However, in the short run changes in CAD and ΔFD*DUM have insignificant impact on economic growth.

4.3. Sensitivity Analysis

Even though we have given the model specification, yet for the purpose of estimation, we conduct sensitivity analysis and use only robust variables, which are not sensitive to different econometric techniques. For this purpose, we run a lot of regressions and choose the most robust variables for our analysis. The robustness of the variables is also apparent from the short run diagnostic test. From the results of the short run diagnostic tests it is clear that there is no serial correlation and hetroscedasticity in the model. To detect the problem of autocorrelation and hetroscedasticty, we use serial correlation Lagrangian Multiplier (LM) and autoregressive conditional heteroskedasticity tests respectively. In order to test the normality of error term, we use Jarque-Bera test. From the calculated value of Ramsey RESET test it is clear that the functional forms of the models are correctly specified. Moreover, the data is normally distributed. In order to analyse the stability of long run and short run coefficients, the CUSUM and CUSUMsq stability test are applied. The results of CUSUM and CUSUMsquare show that all variables are cointegrated. Moreover, the results show that neither the CUSUM nor the CUSUMsq test statistics exceed the critical values, which ensure that all models are stable and correctly specified. Furthermore, the robustness of the variables is also apparent from the constancy of parameters by using both ARDL and 2SLS econometric techniques. The models are not sensitive to changes in econometric techniques.

5. CONCLUSIONS AND POLICY IMPLICATION

In this study we examine the dynamic effects of fiscal policy on macroeconomic activities over the period 1972–2008. ADF test, PP test and Ng Perron unit root test are applied to test the unit root hypothesis to all variables. The results of ADF and PP unit root tests show that all variables are integrated of order one except CAD and PINV. The results of Ng-Perron unit root test show that all variables are integrated of order one except CAD. The results of the unit root tests enable us to apply ARDL co integration techniques.

Using modern econometric approaches, the results show that there is a long run relationship between overall fiscal deficit and economic growth. It is clear from growth equation that all variables are important factors affecting economic growth. The negative and significant coefficient of fiscal deficit indicates that expansionary fiscal contraction occurs in Pakistan. The main reason of expansionary fiscal contraction in Pakistan is that government activities are mostly politically motivated and unproductive and therefore restrains growth. The huge fiscal deficit is due to non development expenditures.

Using the non linear equation, we find that fiscal deficit positively affects economic growth up to some threshold level. Beyond that threshold level, fiscal deficit negatively affects economic growth and has some serious macroeconomic consequences.

For short run dynamics. Error Correction Mechanism (ECM) has been used. The results of ECM suggest that in the short run overall fiscal deficit exert significant impact on economic growth. This reveals the fact that in the short run rising fiscal deficit creates excess demand, which encourages firms to use more of their existing capacity and people to spend more, and hence economic situation in the short run improves, but in the long run rising fiscal deficit has some serious implication for economic growth. The feed back coefficient is negative and significant suggesting that about 0.43 percent disequilibrium in the previous period is corrected in current year.

The study recommends that the government should keep its budget deficit in the narrow band of 3 to 4 percent of GDP. Beyond this limit the unsustainable budget deficit could have undesirable macroeconomic costs and the government's macroeconomic objectives such as low inflation and high economic growth might be in jeopardy. If the government is able to reduce its budget deficit, eventually she would get rid of the vicious circle of debt overhanging problem, because the debt-GDP ratio would increase only if the fiscal deficit as a percentage of GDP exceeds the real GDP growth rate. However, the reduction in fiscal deficit must be due to reduction in the public expenditure rather than an increase in resource mobilisation. The government should curtail non productive expenditures; high attention should also be given to the Public Sector Development Plan (PSDP), as it has a long term impact on economic growth.

Appendices

APPENDIX 1

DEFINITION OF THE VARIABLES

The definitions of all variables (explanatory variables and instrumental variables) used in this study are given below.

Overall Budget Deficit/Surplus = (Current Account Expenditures + Development Expenditures) – (Repayment of Foreign Debt) – (Net Revenue Receipts) – (the contribution by autonomous bodies) – (The amount earned by disinvestment of shares).

Economic Growth = Growth rate in Real Gross Domestic Product (GDP)

Gross Private Domestic Investment = (Business Fixed Investment + Residential Investment) + (Inventory Investment)

Current Account Balance = Net Exports of Goods and Services + Net Income from abroad (NFP) + Net Unilateral Transfers

Inflation = Consumer Price Index (Inflation rate)

Public Debt = Total public debt as a percent of GDP.

Exchange Rate = Real exchange rate

Interest Rate = 6 months T- bill rate for short run and 9 months T-bill rate for long run.

Money Supply = M1 + Saving Deposits including MMDAs (Money Market Deposit Accounts) + Small Denomination time Deposits + MMMFs (Money Market Mutual Funds).

APPENDIX 2

EMPIRICAL RESULTS USING 2SLS

Table 1

Estimated Coefficients Using 2SLS Techniques

Dependent Variable Real GDP Growth Rate (Y) Regressors	2SLS Technique[6] Coefficients
FD	–1.11**
PINV	0.21*
INF	–0.03***
CAD	–0.69***
FD^2	–
FD *DUM	–0.12**
	$R^2 = 0.97$
	Adjusted $R^2 = 0.96$
	F-statistics = 1532.06
	Dh Stat = 1.86

Note: *, ** and*** represent Significant at 1 percent, 5 percent and 10 percent level of significance.

[6]INT, M2, ER, PD and all of the variables in the growth equation that are believed to be uncorrelated with the disturbances are used as instrumental variables.

APPENDIX 3

RESULTS OF CUSUM AND CUSUM$_{SQ}$[7]

Fig. 1. Plot of Cumulative Sum of Recursive Residuals of Growth Equation

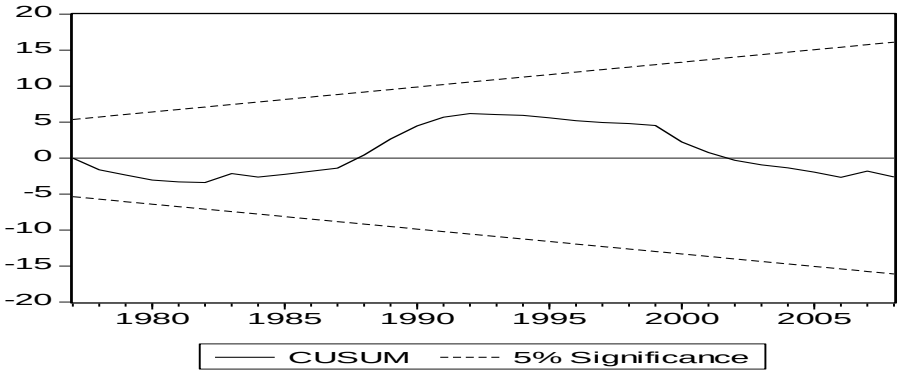
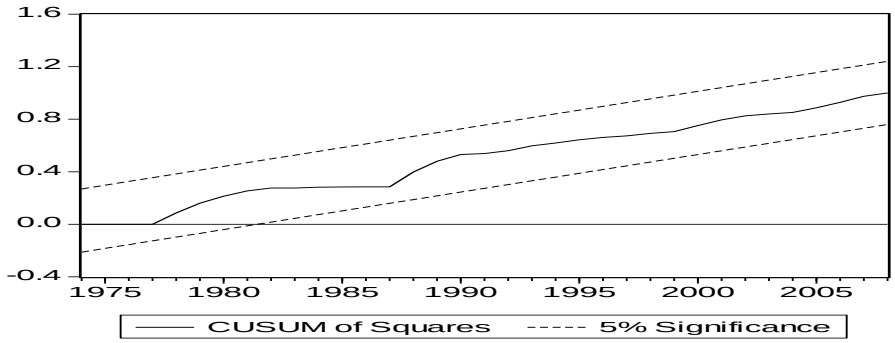


Fig. 2. Plot of Cumulative Sum of Squares of Recursive Residuals Growth Equation



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[7]The straight lines represent critical bounds at 5 percent significance level.

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Impact of Fiscal Decentralisation on Human Development: A Case Study of Pakistan

RASHID MEHMOOD and SARA SADIQ

1. INTRODUCTION

Fiscal decentralisation refers to the transfer of authority and responsibility from central government to sub-national or the local government. It is mostly pre-assumed that fiscal decentralisation can play important role in the efficient allocations of resources and improvement of the political, economic and social activities. Many studies unlock the relationship between federal government and sub-national governments or local government. Fiscal decentralisation theories mostly based on Richard Musgrave's (1939) functions of government. He defined three roles: stabilisation, allocation and distribution whereas, only the allocation function seems to be appropriate to fiscal decentralisation theory. Because these three functions are not equally suitable for all level of governments and it is necessary for efficiency that each function is properly matched to the level. It is a step forward towards more responsive and efficient governance if the decentralisation is done properly [Oates (1972)]. The logic behind fiscal decentralisation is accountability and efficiency; the smaller organisations are more fragile for accountability than the larger ones. However, decentralisation has not always been effective in the provision of service delivery and hardly accountable due to lack of community participation. If there is no spill over effects and in the absence of diseconomies of scale it could be effective and efficient. The sub-national governments where the externalities are internalised and scale economies are acceptable fiscal responsibilities should be assigned [Rodden, *et al*. (2003)]. The sub-national governments are much closer to the people and they are better informed to respond according to their demands of goods and services [Hayek (1945); Qian and Weingast (1997)]. Service deliveries are highly dependent on transfers from central governments. It is necessary to increase the revenue autonomy of sub-national governments and it is linked with the service delivery in social sector [Elhiraika (2007)]. Lower level of governments is closer to the people and much aware of the preferences of localities. Service deliveries should be located at the lowest level because decentralised provision of services increases the economic welfare [Oates (1999)].

This study examines the fiscal decentralisation trend in Pakistan. The 1973s constitution provides a clear distinction between the central and the provincial

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[1]Sub-national Governments refers to Provincial Governments.

government's taxation powers and sharing of revenues. The constitution and the amendments support more the decentralised system than unitary one. First attempt was made by Bhutto in 1974 and the National Finance Commission was formed in which the shares between central and sub-national governments were 80:20 respectively. Through the developmental process now the shares of Central and sub-national governments are set at 56:44 respectively (7th NFC Award). This increase of the share enables the sub-national governments to enhance the service delivery and efficiently allocate the resources in the most demanding areas. It is commonly argued that decentralisation improves the efficiency of resource allocation [Oates (1999)]. But in reverse during the last five years the health expenditure shrank at provincial level. Although sub-national governments share increases from 20 percent to 37.5 percent (Table.1) in 1996 NFC Award but health and education expenditure of all the sub-national governments squeezed in average after this. (Table 2). Whether this increase in shares of sub-national governments in the 7th NFC Award will increase the Expenditure of Social Sector?

The main focus of the paper is to analyse the efficiency of provinces in the provision of health and educational services and their impact on human development. Matheson and Afar (1999) proves positive impact of decentralisation on health and education outcomes. In Model I variables are taken as a consolidated decentralisation of revenues, expenditure and urban living. The results of the model I suggest the positive impact of decentralisation indicator on Human Development Index. In the IInd Model, expenditure on health and education as a percent of total expenditure of province are taken as dependent and proxy for human development. The analysis shows that the provinces are not yet independent in their revenue and expenditure composition due to dependency of federal transfers. Provinces are far away from fiscal autonomy having less political decentralisation.

2. LITERATURE REVIEW

Fiscal decentralisation is considered one of the essential tools to improve the economic growth, efficient public service delivery and better infrastructure in the case of developing countries. There are many studies about the fiscal decentralisation. The social sector service delivery is efficiently addressed by the decentralisation and is evidenced by the different studies that they have positive and significant relation in many cases. It is commonly argued that the devolution of powers and functions may remove the obstacles to government decision-making and implementation process [Meager (1999)].

Kiran (2005) studied the gains of decentralisation at state-level in India and builds a panel data model for 16 Indian states from 1980-2001. The results show that the decentralisation has the positive effect on the standard of living of residents of the state. Further he includes many social variables like spending on the education and health to find out the impact of decentralisation on the social sector and the benefits vary from state to state but fiscal decentralisation have overall positive effect on the economic growth at the expense of regional disparity. As the less benefit is exercised by the poor states and higher benefit by rich states, this widens the income inequalities among the states. Halder (2007) measures the fiscal decentralisation by three different measures: expenditure ratio, revenue ratio and composite ratio while the last ratio has more explanatory power than the previous two. All the measures of decentralisation have the

same results that the fiscal decentralisation has positive correlation with HDI, life expectancy, and GDP while negative correlation with infant mortality rate. Elhiraika (2007) studies the impact of fiscal decentralisation on the public service delivery basic focus is on the sub-national governments' autonomy measure by own-source revenue in South Africa. He finds that the provincial own-source revenue is negatively related to the health expenditure as the health service is assumed to be the responsibility of central government but positive relationship with per-capita income that means if the population gets richer the provincial government will allocate more resources to health but the result is contradictory. Education demand is also found insignificant to the changes in intergovernmental grants. It is also found out that the richer provinces get more revenue. Fjeldstad (2001) finds out whether fiscal decentralisation is better or worse in the prevailing economic condition of Tanzania and further discusses the role in public sector delivery. He suggests that the high corruption, poorly defined taxes, distortion in public service could further aggravate the distortion if decentralisation is increased further without judging the capacity of local bodies. So there is a need of restructuring, capacity building and improving the integrity of the system otherwise decentralisation will result in mismanagement and high corruption. Atsushi Limi (2004) finds out the empirical relationship between fiscal decentralisation and economic growth in Pakistan using instrument variables cross-country from 1997 to 2001. He measures decentralisation by the local share of expenditure to the total expenditure. The results show that fiscal decentralisation has positive impact on the per-capita of a country and further it improves the public service provision. Atsushi emphasises that the fiscal decentralisation on expenditure side is more effective for economic growth.

Peterson (2002) presents a draft for World Bank about the fiscal decentralisation of Pakistan and highlights the political, governance, and service delivery issues. He discusses that the uncertain authority that is allocated to the provinces and local government raise many conflicts, there should be the need of the direct grants to private organisation to encourage the citizen's participation. Citizen Community Boards are the non-profit bodies which should be developed in a way to increase and improve the service delivery; and to enhance the accountability and better resource mobilisation. As the District governments have the important human service delivery functions: education and health care, but the efficiency of the service delivery is the outcome of many factors: skill of employees, adequate government resources, willingness of public institutions and employees. He further mentions some important flaws in the fiscal decentralisation like low level of own-source revenues, failure of the quality service delivery, higher dependence on grant by the provinces than the urban population, predetermined taxes and tax rates. Hafiz and Aisha (2001) presented a paper on fiscal decentralisation and the devolution of power at Social Policy and Development Centre. He discusses the major issues of fiscal decentralisation that arises from National Reconstruction Bureau (NRB) devolution plan. He proposes that as the federal government has the surplus revenues while the provincial and local governments are in deficit so there is a need for large transfers from federal to provincial governments but it is important whether the transfer criteria should depend on the population, measure of backwardness, service delivery and many other factors. Taxes assignment should be clear cut to avoid the overlapping of tax bases, immobile taxes should be levied by local bodies otherwise there will arise a

problem of tax competition. Tax exporting should be reduced as it creates regional disparities. And revenue assignment should be simple and include other criteria than population like service transfer, revenue collection, and backwardness. While grants should be for general purpose so that the local governments may have the autonomy to spend according to their needs and preferences.

Levaggi and Smith (2003) find the implication of decentralisation on the efficiency and equity of health sector in UK, Spain and Italy. He concludes that there are three important issues to deal with, when decentralisation in health care is done: utilising of information advantages, need of diversity amongst local laws, spill over effect between laws. Minassain (1997) finds out that how the fiscal decentralisation constraints central government ability to carry out their predetermined macroeconomic management and this cost could be minimised. He concludes that hard budget constraint and much involvement of sub-national governments in macroeconomic management could reduce this cost. Habib, *et al.* (2003) used the panel data set and found positive impact of fiscal decentralisation on health and education among the provinces of Argentina. He observes that the disparity in educational output and infant mortality rate between high and low income provinces decreases significantly from 1970 to 1994 due to rise in per-capita health and education expenditure in low income provinces. Abay, *et al.* (2001) tests empirically the impact of fiscal decentralisation on rural mortality rate in India from 1990 to 1997. He argued that fiscal decentralisation could be more effective If it is done alongside political decentralisation. The results of random effect model show the statistically significant negative relation between fiscal decentralisation and infant mortality rate.

Skira (2006) studies the relationship between fiscal decentralisation and poverty for 200 countries from 1965-2000 and 2004. He has derived some ratios for decentralisation like expenditure decentralisation, education decentralisation and health decentralisation and also included the LIS (Luxemburg Income Study) poverty data, which is percent of persons living in families below 50 percent of the median family income. He separately measures the decentralisation impact of these ratios. The result of simple to moderate levels of fiscal decentralisation and poverty reduction measured by HDI shows negative result while on high level of decentralisation findings are contrary to it, positive association between decentralisation and poverty reduction outcomes. While poverty measured by LIS shows that fiscal decentralisation does not reduce poverty. Results of Poverty measured by health and education decentralisation show that there exists negative correlation between drop out ratios and fiscal decentralisation meaning that it has a positive effect on poverty reduction. Beox, *et al.* (2006) studies the linkages between poverty and fiscal decentralisation, showing how the poverty reduction is possible by expenditure assignment, revenue assignment and intergovernmental transfer. He finds out that when the expenditure assignments are clear and stable, the devolution will be more pro-poor. He emphasises that local government should have power to levy fees and local taxes that will improve their potential and service delivery at all levels. Decentralisation in health and education will lead to the involvement of citizens in decision-making and make local service provisions more accountable.

Rao (2003) has done a comparative study in the pre and post reform era in case of China and India and further identified the emerging challenges for the transition countries. He concludes that it is necessary to develop an efficient expenditure, tax and

intergovernmental system and capacity-building of institutions at centre and local level. Anwar (2004) has studied the fiscal decentralisation problems and progress in 33 developing and transition countries 1980-1999. Among them in 12 countries the primary education was the sole function of local bodies while in 9 additional countries it was shared between centre and local bodies and Pakistan is among one of them. He finds that the transition countries' sub-national governments expenditure as percentage of GDP, total expenditure, educational and health expenditure represents a declining trend while in case of developing countries the expenditure on education and health spending is increasing over time. Shah (2003) presented a report at UNESCO seminar about the decentralisation in educational system in Pakistan. He has highlighted certain issues like citizen have no access in the decision making and limited access to social service, central government does not respond to the local bodies need. Highly centralised education system is the main reason of distortion and lack of efficiency and effectiveness of service delivery at grass root level.

3. OBJECTIVES OF FISCAL DECENTRALISATION IN PAKISTAN

Objective of fiscal decentralisation in Pakistan is the same as in other developing countries, the provision of service delivery and increase the fiscal autonomy of sub-national governments. It creates harmony among the provinces and strengthens the federation. Public finance literature suggests that fiscal decentralisation increases the efficiency of sub-national governments in the provision of service delivery. In contrast to the theory of real fiscal decentralisation, due the central type of government in Pakistan, most of the revenues collected by central government and distributed among the provinces through typical revenue sharing formula (NFC). The provinces in turn redistribute the revenue among the lower tier of governments or spend through the ministries in the absence of local governments (PFC). Table1 shows that the provincial share increases with the passage of time and in 7th NFC award it crossed the limit of fifty percent. This significantly changes the ratio of allocation of transfers to the provinces up to 56 percent of the total share enhancing the decentralisation process.

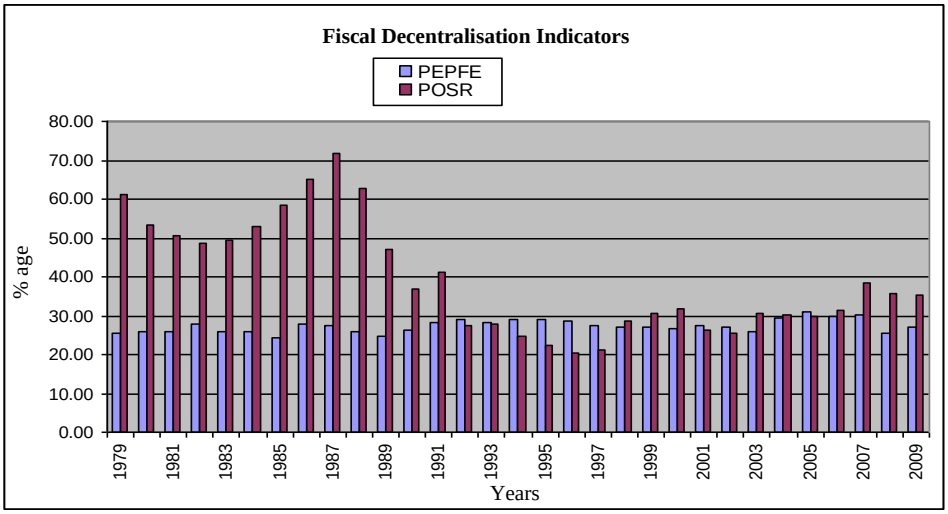
Under the constitution (1973), maintaining local governments is a provincial subject. Constitution allows national government to empower the provinces and establish local governments. Unfortunately, in Pakistan local governments have been established by the Dictators without any protection from parent provinces and therefore fail to deliver. Pakistan has a confused system of fiscal decentralisation having large expenditure assignments almost 27 percent in 2010 to provincial governments with limited tax autonomy of provinces which was 13.77 percent in 2010. The expenditure decentralisation and tax autonomy in 1989 were 25 percent and 17 percent respectively (Fig. 1). This indicates limited tax decentralisation in the country. It is observed through calculations, the tax autonomy of the provinces is limited and they do not have decision power to collect the tax, set the rate and determine the base. Rodden, Gunnar, and Jennie (2003) suggested that the accountabilities and responsibilities of central and sub-national governments should be divided into well-defined, mutually exclusive categories. Unfortunate many efforts failed to create fiscal federalism in country.[1]

[1]Fiscal federalism refers to a political system with a constitution and powers to both of central and decentralised level of governments, see Oates (1999).

Table 1

Year	Federal %	Provincial %
1974	80	20
1979	80	20
1985	Interim Award	Interim Award
1990	80	20
1996	62.5	37.5
2000	Interim Award	Interim Award
2010	44	56

Source: Economic Survey of Pakistan.
7th Award: 44:56 for 1st year and remaining year it will be 42.5:57.5.



Source: FBS, *Statistical Year Book*.
PEPRF = Ratio of Provincial Expenditure over total Expenditure.
POSR = Ratio of Provincial own-source revenue over total revenue.

Fig. 1.

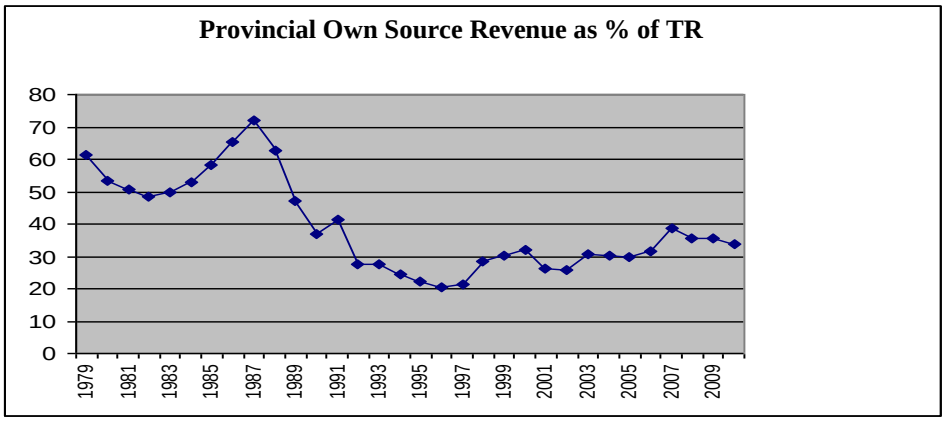
3.1. Human Development Index (HDI)

HDI is developed by UNDP in 1990 it's a better measure for Human Development. HDI is a fraction and capture the over all human developments in the country. It measures the three basic areas of human development: the longevity, measured by life expectancy at birth; Knowledge, measured by adult literacy rate and gross enrolment ratio assigned 2/3 and 1/3 weights respectively and the decent standard of living, measured by per-capita PPP income of the country. Sikira (2006) uses HDI as a dependent variable and regressed on expenditure decentralisation and other variables and found positive relation. In this paper we are too using HDI as a dependent variable and regressing it on expenditure as well as revenue decentralisation variables: provincial own-sourced revenue, ratio of provincial expenditure over the total government expenditure and further adding the ratio of urban population to the total population as the urban population contributes to push and pull factors which exert pressure on service delivery.

3.2. Revenue Decentralisation

Own-source Revenue of Sub-national Governments

Figure 2 shows that provincial own-source revenue as a percentage of total revenue of provinces starts decreases in 1987 and then in 1996 after 5the NFC award increases slightly. In case of those countries where sub-national governments have less control over tax autonomy, and sub-national governments are dependent on the transfers from central government, own-source revenue is better measure. In public finance literature it is considered as a weak measure of decentralisation which does not show the tax autonomy of sub-national governments.



Source: Fifty Years of Statistics.

Fig. 2.

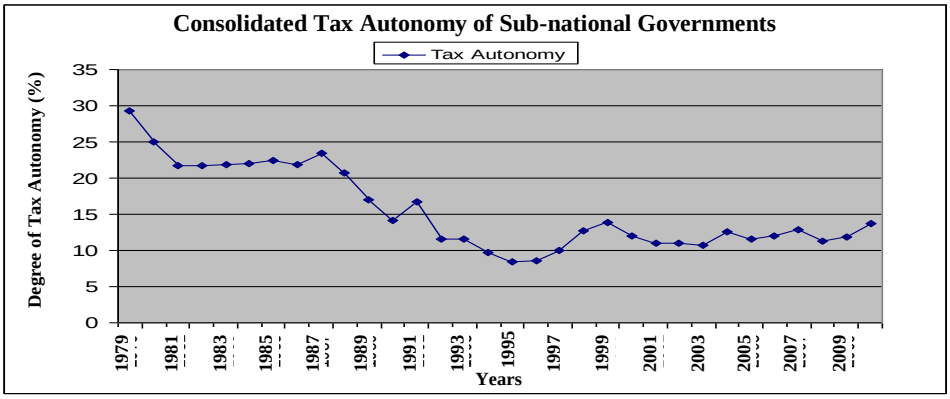
3.3. Tax Autonomy of Sub-national Governments

(Degree of Tax Revenue Decentralisation)

Tax autonomy of sub-national governments shows the rights of sub-national governments to define the tax base, determine the rate and define the tax relieves for individual and firms under the jurisdiction. The tax autonomy of sub-national governments is necessary for the discretion and preferences in spending. In fact Stegarescue (2005), this indicator captures the real decentralisation in revenues generation and decision power of the sub-national governments. Leviathan literature suggests that the decentralisation of the taxing powers increases the efficiency of the governments. Brennean and Buchannan (1980) examined that the taxing powers should have separate jurisdictions with restrictions. It increases the competition among jurisdictions. Figure 3 suggests that the degree of tax autonomy of the provincial governments decreased significantly since 1987 then its starts increasing slightly after 1995.

$$TA = \frac{SNG\ Own\ Tax\ Revenue}{SNG\ Own\ Tax\ Revenue + Federal\ Tax\ Assignments}$$

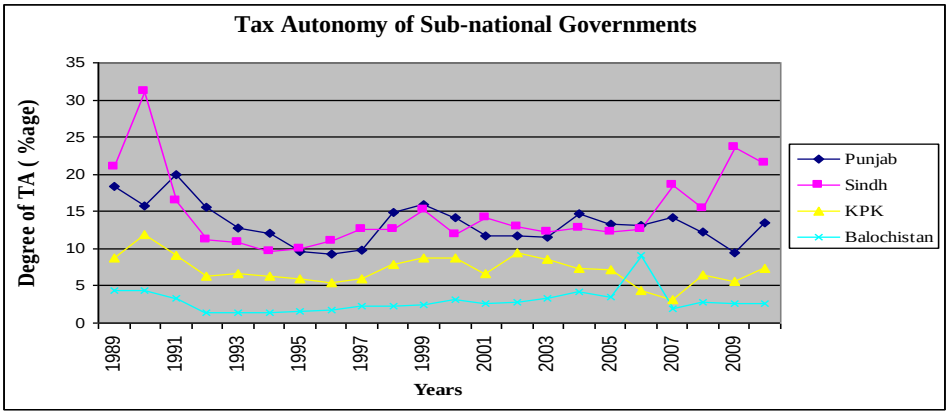
Where TA = Tax Autonomy, SNG = Sub-national Governments



Source: Statistical Year Book, FBS.

Fig. 3.

Figure 4 shows that the tax autonomy of Balochistan among the all provinces and it depends on the federal transfers more than other provinces, which accounts for 93 percent of its total revenue. Own-source revenues are low because of a narrow revenue base and poor revenue administration. [ADB (2008)]. The tax autonomy of Sindh and Punjab gives mix results but after 2006 Sindh's own tax revenue increases significantly than other. It is importantly argue that the increase in this ratio shows the independency of provinces than federal transfers and indicate the potential of revenue generation.



Source: Statistical Year Book, FBS.

Fig. 4.

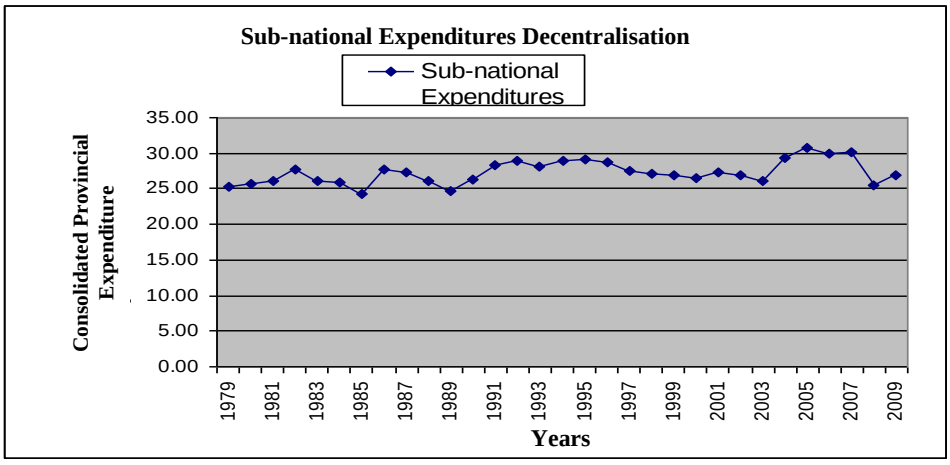
3.3.1. *Impact of Tax Autonomy of Sub-national Governments on Education and Health*

In common practice decentralisation is considered effective in the public sector management and improving the overall health facilities. World Bank reports suggest that; delineate responsibilities among stakeholders and formally codified responsibilities in legislation, regulation or in other instruments. In general, the impact of decentralisation on service delivery is not efficient. Rational Choice theory suggests that individual thinks

how to achieve the concrete goal that embodies his values to allocate his scarce resources in terms of means and ends [Beer (1976)]. Fiscal autonomy empowers the sub-national governments to allocate resources according to needs and preferences of residents. While in centralisation the allocation of resources might be inefficient due to heterogeneity of choices among the regions. Modern economic theory also assumes that the individual allocates their resources in the way where its utility maximises. If along with the tax autonomy the sub-national governments maximise the utility of their residents in the provision of social services, the revenue of sub-national governments will be enhanced.

3.4. Expenditure Decentralisation

Figure 5 shows the little increase in provincial expenditure as percent of federal government expenditure. In 1979 sub-national governments' expenditure was 25 percent reaches maximum of 31 percent in 2005-06 and after ups and downs it's nearly 27 percent in 2009. As the sub-national government expenditure shows upward trend from 2009 due to the formation of local government and the huge transfers of fund to the local bodies through provinces.



Source: Statistical Year Book, FBS.

Fig. 5.

3.5. Urban Population

The considerable growth in urban population impacts the human development in Pakistan. According to 1981census population in urban areas was 28.3 percent and in 1998 it increases up to 32.5 percent. Urbanisation attributed to push and pull factors. The significant growth (4.8 percent) in urban population in 80s is mostly due to rural immigration. The pull factors in urbanisation are availability of jobs in industry and services, better education and health facilities [Zaidi (2005)]. The pull factors of urbanisation also exert a pressure on service delivery in social sectors. Service delivery in social sector increases the revenues and expenditure composition and enhances the human development. While the push factors like unemployment, price and availability of land has adverse effect on the human development.

3.6. Service Delivery Health and Education and Their Outcomes

Provincial Health and Education Expenditure as percent of Total Expenditure.

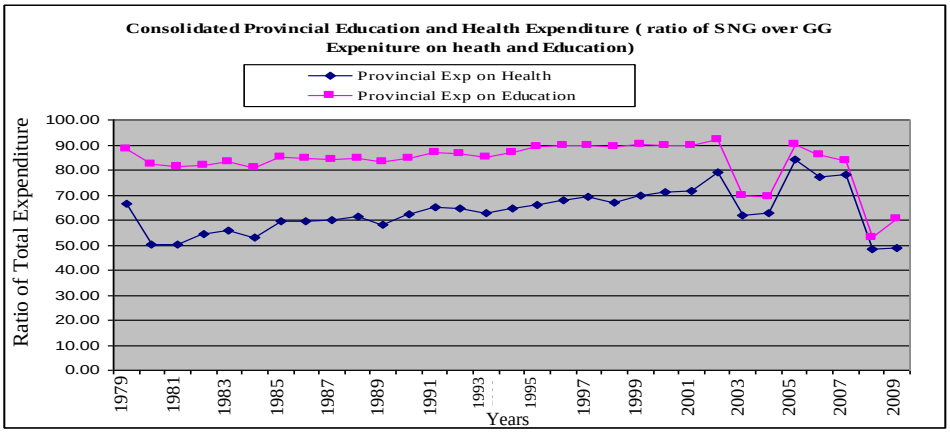
Table 2

	1989-1996		1997-2009	
	Health	Education	Health	Education
Punjab	5.80	25.49	4.8	14.20
Sindh	6.14	22.50	4.76	13.47
KPK	6.30	23.32	5.69	20.59
Balochistan	6.83	17.44	4.88	11.80

Source: Statistical Year Book (Various Issues).

Provincial Expenditure on Education FBS and Health (percent of Federal Expenditure)

After 18th amendment the health and education sectors are the solely provincial domain. The provincial governments can improve the social services delivery and set the expenditure composition [Tiebout (1956)]. This process can enhance the resources and social capital. The Figure 6 shows that the sub-national governments are more decentralised in health and education expenditure. This variable measures the expenditure autonomy of sub-national governments over the expenditure of health and education, and affects the service delivery [Skira (2006)].

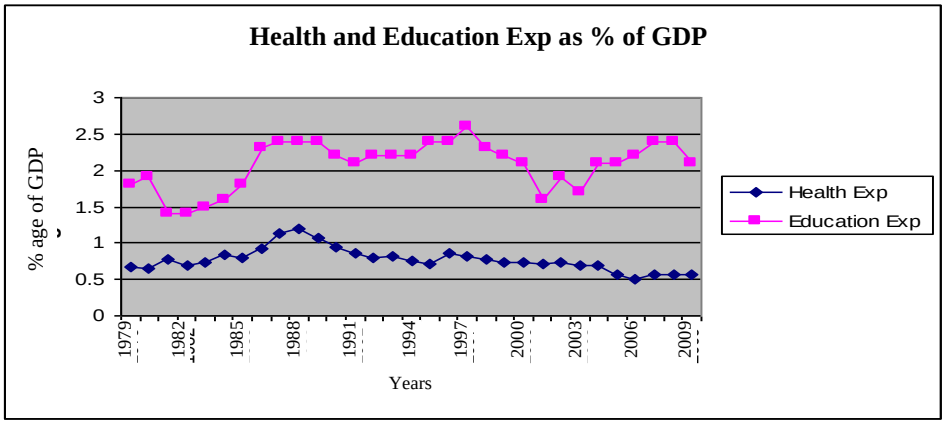


Source: Statistical Year Book (FBS).

Fig. 6.

Autonomy in service delivery sets the preferences of sub-national governments to improve the human development in the region. Figure 6 shows the trend in sub-national governments' expenditure preferences in the provision of health and service delivery across the provinces, this measure suggests in Government Finance Statistics (GFS) as health and educational decentralisation. World Bank (2006) studies consider that, in common practice decentralisation could be effective in the public management and improves overall health facilities. Studies suggest that responsibilities are formally

codified in legislation, regulation other budget binding instruments that are the hurdles in the way of provision of service delivery. Khaleghian (2004) also finds mix results for different service provision in different countries. Fiscal decentralisation is fruitful along with political decentralisation. Before the devolution plan education expenditure was stagnant during 1995 to 2001 and it starts increasing significantly after 2003 almost 31 percent at all levels of governments. Before the devolution plan annual growth in literacy rate was 0.3 percent, which significantly increases after devolution up to 1.4 percent. The other indicator of social development is health. There is no significant change in the rate of improvement in key health outcomes like life expectancy and mortality. During the period the share of allocation to general hospitals and clinics by three provinces excluding Sindh declined. [*SPDC Annual Review* (2006-07)].



Source: Pakistan Economic Survey, various issues.

Fig. 7.

Figure 7 Show that health and education expenditure as percent of GDP is very low. Pakistan among the SAARC countries has lowest rank in case of expenditures on afore-mentioned sector. Education expenditure was 2.6 percent of GDP and health expenditure was 1.4 percent of GDP (1997) were ever highest in the history of country. The squeeze in social sector expenditure is one of the major causes of slow economic and social development [PHCR (2003)]. During nineties Pakistan falls in low development countries list. After 2003 the HDI improves slightly and again come in medium development.

4. MODEL SPECIFICATION

$$HDI = F(POSR, PEPFE, PUP) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Where

HDI = Human Development Index, POSR = Consolidated provincial own-source Revenue.

PEPFE = Ratio of Provincial Expenditure over Total Government Expenditure, PUP = Ratio of Urban population to the total population.

4.1. Methodology

As the time series has usually the unit root problem so we apply the Augmented Dickey Fuller (ADF) unit root test to make it stationary. We further examine Long run relationship among variable so we will use Johnson co-integrating test. After applying unit root test to each variable the results show that all the variables are stationary at first difference so we apply Johnson co-integrating test to find out the Long run relationship between the variables. (Table 3). The null hypothesis of the ADF is that series has unit root.

$$\Delta Y_t = \Psi_o + \delta_t + \Psi_1 Y_{t-1} + \beta\Sigma\, \Delta Y_{t-1} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Long run Co-integration Test

For long run relationship we have applied the likelihood ratio test that is based on the maximum eigenvalue and trace statistics of the stochastic matrix of the Johansen (1988) procedure. As our ADF test results show that all variables are co-integrated at the same level so JJ co-integration test is appropriate to find the long run relationship among the variables.

4.2. Data and Empirical Evidence

4.2.1. *Model I*

The model has been estimated using annual data from 1976- 2009. Data has been collected from fifty years of statistic and other various Annual reports of SBP, World Development Indicator and Human Development report by UNDP and SPDC reports.

Table 3

Test for Unit- Root: (ADF with Drift and Trend)

Variables	Level	First Difference
HDI	–0.876788	–5.001944*
PEPFE	–2.08233	–6.082967*
POSR	–1.644923	–4.07786*
PUP	1.575772	–10.42968*

Note: Schwarz information criterion is used to select the optimum lag length.
(*) Significant at 1 percent Level (**) significant at 5 percent level (**) significant at 10 percent level.
All the entire three variables are Non Stationary at level but found Stationary at 1st Difference.

Once the series may be integrated at first difference by using ADF, it is appropriated that by applying Johnson Co-integration technique can check long run relation. The results in Table 4 suggested that there exists long run relation among the variables. Both Maximum Eigen value and Trace statistics shows two co-integration equation at 5 percent level of significance. Table 5 shows that decentralisation indicator of revenue, expenditure and ration of urban population are significant and having positive sign. As urban population increase, the income per-capita and the demand for health and education increase. With the more decentralisation and increase in urban population impacts significantly and positively human development across the country.

Table 4

Johnson Unrestricted Co-integration Rank Test

Hypothesised No. of CE(s)	Hypothesis	Trace		Max Eigen Statistic	
		Statistic	Critical Value	Statistic	Critical Value
None *	Ho; r=0,				
	H1; r≥1	74.48846	47.85613	34.14526	27.58434
At Most 1 *	Ho; r=1,				
	H1; r≥2	40.34320	29.79707	29.56517	21.13162
At Most 2 *	Ho; r=2,				
	H1; r≥3	10.77804	15.49471	8.048749	14.26460
At Most 3 *	Ho; r=3,				
	H1; r≥4	2.729288	3.841466	2.729288	3.84146

*Denotes rejection of the hypothesis at the 0.05 level.
Trace test indicates 2 co-integrating eqn(s) at the 0.05 level.
Max-eigenvalue test indicates 2 co-integrating eqn(s) at the 0.05 level.

The derived Equation (3) states the long run relationship among HDI, Decentralisation and urban population.

$$HDI_t = 0.00412 PEPFE_t \Delta + 9.96\ POSR_t + 0\ .0239\ PUP_t \quad \ldots \quad \ldots \quad (3)$$

Table 5

Normalised Cointegrating Coefficients

Dependent Variable: HDI	
PEPFE	0.00412
POSR	9.9650
PUP	0.023968

4.2.2. *Model II (Panel Data)*

The model has been estimated using four cross-sectional data for four provinces for the period of 1989-2009. Equations (5) and (6) are health and education. In both equation dependent variables are health and education expenditure as percent of total provincial expenditure. Independent variables are provincial revenue and decentralisation indicators as used in GFS. Panel data is used to pool the cross-sectional units at time. This data have both the cross-section as well as time series dimension. There are two main regressions of panel data: fixed effects regression and random effect regression. The estimated model is simple linear model:

$$Y_{it} = \alpha + \beta X_{it} + \mu_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

For $i = 1,2 \ldots . N$, and $t = 1, 2, \ldots\ldots, T$

$$HE = F\ (POSR, PEFE) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

$$EDE = F\ (POSR, PEFE) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

Table 6

	Education		Health	
	Coefficients	*t*-statistic	Coefficients	*t*-statistic
Constant	12.4752*	7.340572	5.9375*	14.36838
POSR	0.1140*	3.429157	0.0175	0.993251
PEFE	0.1829	1.373243	–0.0898**	–1.949059
R^2	0.72		0.32	

Fixed Effects; (**) and (*) indicate significance at the 5 percent and 1 percent levels, respectively.

The results (Table 6) of panel data estimation for provinces shows that provincial own source revenue have positive and significant impact on educational expenditure across the provinces. But we get opposite results in case of health expenditure as share of total provincial expenditure own-source revenue has insignificant relation while the provincial expenditure as the share of total expenditure shows negative and significant result. These results indicate the squeeze in health expenditures across the provinces.

5. CONCLUSION

The main focus of this paper is to provide empirical evaluation, theory and evidence on the relationship between fiscal decentralisation and human development for Pakistan. Fiscal decentralisation is the basic tool for the efficient provision of service delivery. The effectiveness of fiscal decentralisation can increase the human development and also strengthens the federation. As our study have suggested that the fiscal decentralisation at the expenditure and revenue side has positively attributed to the HDI and results further suggested that the urbanisation variable has positively and significantly impact on HDI because of the pull effects outweigh the push factors. As Table 2, shows that there is high distortion in education and health expenditure especially last two years in all the provinces so there is a need of efficient allocation and prioritising of expenditure. As far as the tax autonomy and own-source revenue is concerned we have seen gradual distortion continuously and show little bit recovery in last two years and distortion respectively (Figures 2 and 3). Especially tax autonomy of Balochistan is lowest in all provinces. As fiscal decentralisation variables are positively related to the human development so there is a need to increase the fiscal autonomy of the sub-national governments and it should be linked with the service delivery in social sector. Fiscal decentralisation on expenditure side is more effective for economic growth as the local bodies have the autonomy to mobilise their resources in the most efficient way. Fiscal autonomy empowers the sub-national governments to allocate resources according to needs and preferences of residents. There should be direct grants from federal government to encourage the citizens' participation which could be effective if done along with political decentralisation in Pakistan.

Local governments should have the power to levy fees and local taxes which will improve their provision of service delivery and increase the fiscal autonomy of

sub-national tiers of government. Decentralisation in health and education will lead to the involvement of citizens in decision-making and make local service provider more accountable. But there is a need of sub-national government to take part in the education and health service delivery at provincial level as it will increase the efficiency and service delivery at grass root level and improve the human development.

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A Comparison of Fiscal Effort by Provincial Governments in Pakistan

IJAZ HUSSAIN and SUMBAL RANA

Considerable variation exists among Provinces of Pakistan with respect to their abilities to raise revenues. This is due to underlying varied provincial characteristics like area, resources, population, nature of economic activities and provincial GDPs. The main focus of this paper is to make inter-provincial comparison of their fiscal efforts after allowing for difference in taxable capacity. Therefore, objective of such inter-provincial comparisons of fiscal effort is to identify whether provincial revenue collection is limited by capacity (revenue base) or if a province is unwilling to exploit the available capacity to generate revenues.[1] This will enable development of the appropriate resource mobilisation strategy for each province and help in enhancing the overall provincial tax revenue to GDP ratio which is currently below 1 percent of the GDP. This analysis will also help policy-makers in designing fiscal equalisation formulae for assisting those provinces which have demonstrated lesser capacity to raise revenues from their own sources.

The paper is organised as follows: Section II identifies trend in revenue receipts of provinces. Section III reviews the literature on measurement of fiscal effort. Section IV describes the methodology used in this paper. Section V presents data and the derived estimates of fiscal efforts. Section VI draws conclusions and gives policy recommendations.

II. TREND IN PROVINCIAL REVENUE RECEIPTS

We observe a low to moderate growth in both provincial tax and non-tax revenues of all provinces (Table 1). Overall, the provincial tax revenue to GDP has declined from 0.55 percent in 2009-01 to 0.46 percent in 2009-10. This is one of the factors contributing to the overall lack of improvement in the tax to GDP ratio of Pakistan. Summary of provincial revenue receipts (Table 1) reveals that share of provincial own tax revenues in

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[1]Stotsky and Mariam (1997) identify this objective for international comparisons.

Table 1

total revenue receipts is very low and appears to have shown no significant improvement over time. Smaller provinces appear to rely more on non-tax revenues as compared to tax revenue receipts. Surprisingly, share of non-tax revenue of Khyber Pakhtunkhwa has been the largest among all provinces since 2000. Sindh has shown substantial growth in the share of non-tax revenues followed by Punjab in last decade. Growth in the share of non-tax revenues both in Khyber Pakhtunkhwa and Balochistan has remained negative in last decade probably due to war on terror.

III. LITERATURE REVIEW

Bahl, *et al.* (2008) point out that economic, political and administrative constraints like low taxable capacity, much of informal sector, weak tax administration, narrow tax base and strong political pressure from interest groups as source of inhibiting revenue growth, at both national and sub-national level, in developing countries, including Pakistan. There are three main approaches in literature to measure tax effort:

(i) Regression or Econometric Modelling.
(ii) Representative Tax System.
(iii) Cost Recovery Index (CRI).

The first two approaches are conceptually similar. In the regression or econometric modelling approach tax revenues or tax to GDP ratios are regressed on variables likely to serve as revenue bases for a sample of tax units (like states, countries or provinces). Estimated parameters or coefficients of explanatory variables are considered as average tax rates which are then applied to each revenue base to calculate potential revenues. Ratio of actual to potential revenue is used as an index of fiscal effort [Lotz and Morss (1997); Bahl (1971); Tanzi (1987); Tanzi (1992); Chelliah (1971); Tait and Echingreen (1978); Ghaus and Khan (1995)].

On the other hand, in the Representative Tax Approach, tax revenues and tax bases are selected for a set of sample tax units (states, countries or provinces). Sum of tax base of all tax units is divided on sum of revenue of all tax units for each selected source to represent national average tax rate which then is applied to tax base to calculate potential tax revenue. Ratio of actual to potential tax revenue serves as an index for fiscal effort [Bahl (1971); Tait and Echingreen (1978); Tanzi (1981)]. Representative Revenue System is, more or less, similar to the Representative Tax System Approach. Representative Revenue System in addition to tax revenues also includes non-tax revenues [State Fiscal Capacity and Effort: An Information Repot (1986)].

Cost Recovery Index measures fiscal effort in terms of recovery of current expenditure from non-tax revenue receipts. It is a ratio between revenue receipts and current expenditure on a particular service or group of services.

Ghaus and Khan (1995) used Representative Tax System Approach to measure fiscal effort of the provinces of Pakistan from 1990 to 1995. This work excludes non-tax revenues from analysis. Our paper contributes to the literature in two ways. Firstly, this paper measures provincial fiscal effort for both tax and non-tax revenues. Secondly, this paper extends previous analysis of provincial fiscal effort from year 2000 to 2010.

IV. METHODOLOGY

In first part of paper, following Ghaus and Khan (1995), this study uses Representative Tax System Approach [Bahl (1972)] to calculate Indices for Fiscal Effort for individual tax revenue receipts of all provinces and Overall Indices for Fiscal Effort for all provinces. In addition to this, in second part of the paper, we also construct Cost Recovery Indices for individual non-tax revenue receipts and Overall Cost Recovery Indices for each province.

As a first step, we identify the major provincial tax revenue sources and respective tax bases. Based on provincial tax revenue statistics, available in Annual Budget Statements of the provinces, we select following major provincial tax revenue receipts and respective tax bases for our analysis as shown in Table 2. Revenue sources with similar tax bases are grouped together.

Table 2

Selected Provincial Tax Revenue Sources and Tax Bases

Tax Revenue	Tax Bases
(i) Stamp Duties and Property Tax	Value added in ownership of Dwellings + Finance and Insurance
(ii) Motor Vehicle Tax	Value added in Transport, Storage and Communication
(iii) Land Revenue and Agriculture Income Tax	Value added in Agriculture
(iv) Electricity Duty	Value added in Electricity and Gas
(v) Tax on Professions, Trade and Callings	Value added in Wholesale and Retail Trade and Other Services

In second step, we estimate average tax rate:

$$tjy = \frac{\sum_{i=1}^{4} T_{ijy}}{\sum_{i=1}^{4} TB_{ijy}}$$

Where tjy measures national average tax rate for tax source j (j=1 to n) in year y

$\sum_{i=1}^{4} T_{ijy}$ = Sum of tax revenue of all provinces from source j in year y and

$\sum_{i=1}^{4} TB_{ijy}$ = Sum of tax base of all provinces for revenue source j in year y

In third step, we apply average tax rate on respective tax base to calculate provincial potential tax revenue from each source j:

$$PTR_{ijy} = t_{jy} \times TB_{ijy}$$

Where PTR_{ijy} = Potential Tax Revenue of province i from resource j in year y.

TB_{ijy} = Tax Base of province i for source j in year y.

In fourth step, we construct an Index for Fiscal Effort (IFE_{ijy}) for tax revenue of province *i* from source *j* in year *y*:

$$IFE_{ijy} = \frac{T_{ijy}}{PTR_{ijy}}$$

In fourth step, we construct Overall Index for Fiscal Effort ($OIFE_{iy}$) for province *i* in year *y*:

$$OIFE_{iy} = \frac{\sum_{j=1}^{n} T_{ijy}}{\sum_{j=1}^{n} PTR_{ijy}}$$

Where $\sum_{j=1}^{n} T_{ijy}$ = Sum of tax revenues of a province i from all sources (*j*=1 to *n*) in year *y*.

$\sum_{j=1}^{n} PTR_{ijy}$ = Sum of potential revenues of province *i* from all sources in year *y*.

For second part of our paper, we select following major significant non-tax revenue sources and revenue expenditures.

(1) Law and Order
(2) Community Services
(3) Social Services
    (i) Education
    (ii) Health
(4) Economic Services
    (i) Agriculture
    (ii) Irrigation

We construct Cost Recovery Index (CRI_{ijy}) of province *i* for non-tax revenue from source *j* in year *y* as follows:

$$CRI_{ijy} = \frac{NTR_{ijy}}{CE_{ijy}}$$

Where NTR_{ijy} is non-tax revenue of province *i* from source *j* in year *y* and
CE_{ijy} is current expenditure of province *i* from source *j* in year *y*

We construct Overall Cost Recovery Index ($OCRI_{iy}$) for province *i* in year *y* as follows:

$$OCRI_{iy} = \frac{\sum_{j}^{n} NTR_{ijy}}{\sum_{j}^{n} CE_{ijy}}$$

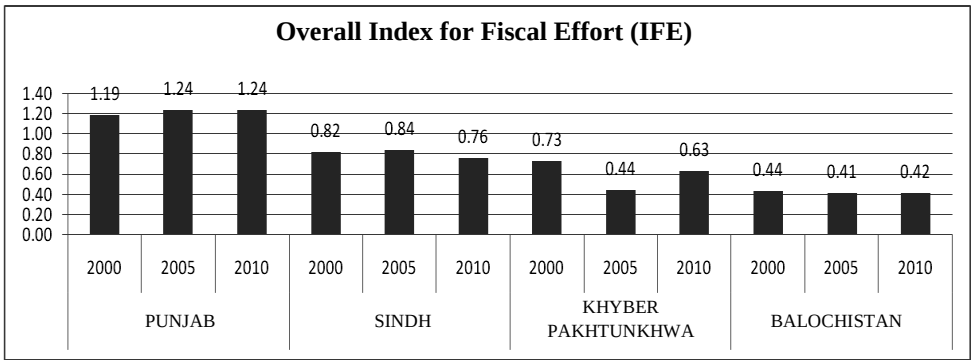
$\sum_{j=1}^{n} NTR_{ijy}$ =Sum of non-tax revenues of province *i* from all sources 1 to *n* in year *y*.

$\sum_{j=1}^{n} NTR_{ijy}$ = Sum of current expenditure of province *i* from all sources 1 to *n* in year *y*.

V. DATA ANALYSIS AND CONSTRUCTION OF INDICES FOR FISCAL EFFORT

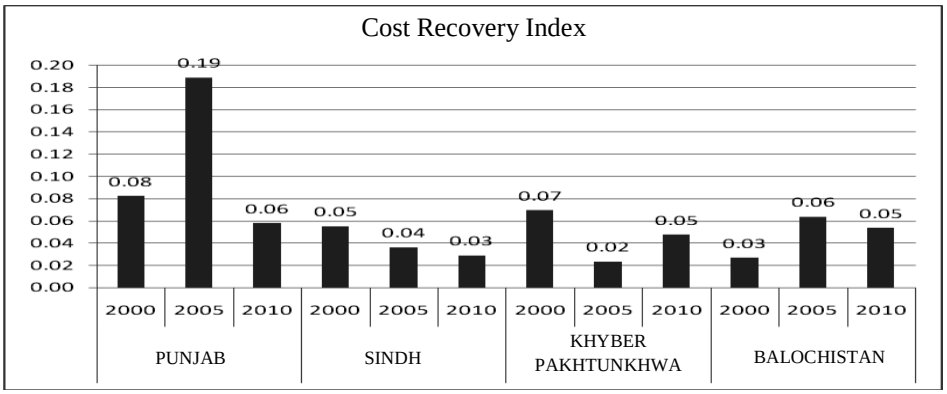
This paper uses Annual Budget Statements of provinces, their White Papers on Budgets for various years and Regional Accounts of Pakistan: Methodology and Estimates-1973–2000 by Kaiser Bengali and Mahpara Sadaqat as main data sources. This study reveals that provincial shares of value added by sector have remained quite stable over the time span of twenty seven years. Therefore, we estimate provincial value added by sector in Table 2-A[2] by using average annual growth rate of provincial shares from 1973 to 2000 based on Regional Accounts of Pakistan: Methodology and Estimates-1973-2000 by Bengali (2005-06). By using methodology described in previous section, we construct following Indices:

(i) Indices for fiscal effort by province for individual taxes,
(ii) Overall indices for fiscal effort for all provinces,
(iii) Cost recovery indices by province for individual non-tax revenues, and
(iv) Overall cost recovery indices for all provinces.



Source: Calculated by authors.

Fig. 1. Overall Index for Fiscal Effort



Source: Calculated by authors.

Fig. 2. Overall Cost Recovery Index

[2]See statistical appendix.

VI. CONCLUSIONS AND POLICY RECOMMENDATIONS

Punjab has the highest fiscal effort which has gradually improved over time since 2000, while the position of Sindh has remained variable in the last decade. Despite this, Sindh has been managing its fiscal effort through imposition of sizable Sindh development fee for infrastructure maintenance (Rs 13 Billion in 2010–11) that it charges from the users of Karachi Port. This implies a very high degree of 'tax exporting' to other provinces. There is also some degree of tax exporting among all provinces in motor vehicle tax because motor vehicles may be used in some other province other than of their registration where tax is collected. But the degree of tax exporting in motor vehicle tax is far less as compared to that in Sindh development fee for infrastructure maintenance. Overall index for fiscal effort of Sindh has dropped to 0.76 in 2010. Fiscal effort of Khyber Pakhtunkhwa has also tended to decline from a high level probably due to military operations on account of insurgency and war on terrorism. Balochistan has shown no improvement in its fiscal effort.

Our estimates show that if Sindh, Khyber Pakhtunkhwa and Balochistan improve their fiscal effort indices to 1, there exists potential for raising Rs 6 billion[3] additional tax revenue i.e., Rs 3 billion from Sindh, Rs 2 billion from Khyber Pakhtunkhwa and almost one billion Balochistan.

Indices for all tax revenues and overall index for fiscal effort for Punjab (greater than or almost equal to one) indicate its firm determination to realise its available taxable capacity (Table 3). For Sindh, on the other hand, low indices (less than one) for all taxes are indicative of scope for improvement in its fiscal effort (Table 3). Our conclusion is consistent with the results of previous study by Ghaus and Khan (1995). There is the potential for higher revenues in Sindh from land revenue and agriculture income tax, and electricity duty. Khyber Pakhtunkhwa needs to focus especially on stamp duties and property tax, land revenue, agriculture income tax and electricity duty to improve resource mobilisation. Balochistan has scope for substantial improvement in its fiscal effort for all taxes except for motor vehicle tax.

All provinces need to raise their cost recovery ratios, especially in economic services. Subsidies on social services may be also, the justified on redistributive grounds. Also, the low national average tax rates for all taxes revenues (Table 3-A)[4] and poor cost recovery levels highlight the roots of fiscal problems faced by the governments. Therefore, we also suggest raising tax rates and user cost recovery for resource mobilisation at province level across the board.

The overall conclusions are, first, the low and generally declining effective tax rates of provincial taxes which have led to a fall in the provincial tax to GDP ratio to below 0.5 percent of the GDP. All provinces need to enhance these rates as the part of their resource mobilisation strategy. Second, fiscal effort varies considerably among the provinces and the smaller provinces in particular have potential for higher revenues which they are currently not exploiting. Third, user charges need to be developed, especially on economic services.

[3]Difference between potential and actual tax revenues.

[4]See statistical appendix.

Table 3

Table 4

Table A-1

Table A-2

Table A-3

Table A-4

Table A-5

Table A-6

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Fiscal Equalisation Among Provinces in the NFC Awards

AISHA GHAUS-PASHA, HAFIZ A. PASHA, and ASMA ZUBAIR

1. INTRODUCTION

Fiscal equalisation refers to attempts within a federal system of government to reduce fiscal disparities among jurisdictions, which emerge due to variation in sub-national jurisdictions ability to raise revenues to meet the public expenditure needs of their residents. This is because of an imbalance in the assignment of revenue sources to sub-national levels and their expenditure needs, given the allocation of the inter-governmental fiscal powers and responsibilities.

In the Pakistani context, the need for transfers is highlighted by the fact that while provincial governments generate only about 8 percent of total national resources, their share in total public spending is 28 percent. Also the fiscal capacity of the four provinces varies, with the relatively more developed provinces being able to self-generate a higher proportion of their resource requirements. As such, transfers take place, according to the provisions of the National Finance Commission (NFC) awards, with the objective of removing both vertical and horizontal imbalances between own-revenues and expenditure.

The purpose of this paper is to examine whether the NFC awards have contributed to the process of fiscal equalisation in Pakistan and if so, to what extent. We start by first highlighting some theoretical issues in the study of fiscal equalisation in Section 2. Section 3 presents international practices in fiscal equalisation. Section 4 reviews the various NFC awards and presents the province-wise trend in federal transfers. Section 5 describes the methodology used in this paper to measure the extent of fiscal equalisation with the help of an index. Section 6 describes the trend in the fiscal equalisation index. Finally, in Section 8 are presented the conclusions.

2. SOME CONCEPTUAL ISSUES

The increasing international trend towards fiscal decentralisation has made the subject both more important and perhaps more controversial. Several issues have been subject to intensive debate. These include the reasons for introducing some form of equalising policy. The basic question is would it not be simpler to reassign functions and

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revenues? Further, if equalisation is necessary or unavoidable, how are fiscal disparities measured across jurisdictions and how is equalisation best achieved?

The case for equalisation must be examined in the context of the fiscal design of the federalism and decentralisation. Preferably the allocation of revenue sources among government tiers should follows the assignment of functions. However a number of problems arise from this preposition. First, allocation of expenditure responsibilities and tax sources should be governed by a set of principles including those based on efficiency and equity. According to Shah (1994) and Pasha (1997) assignments of functions are primarily based on efficiency considerations including spatial externalities, economies of scale, administrative and compliance costs and preservation of internal common market. As opposed to this, taxes are assigned on the basis of degree of mobility of tax bases, efficiency in tax administration, avoidance of 'tax exporting', etc. These considerations are particularly important in the context of developing countries where institutional capacities are limited. As such the matching of expenditures and resources at the sub-national level may not always be feasible or desirable.

Second, even if overall balance between functions and resources is largely achieved at every government tier, the balance may not be obtained for each unit within a particular tier. Also, decentralised functions undergo modification over time, following changes in the preferences for service provision or in the technology of public good production. Therefore a unit-by-unit allocation of functions and resources and their periodic adjustment is likely to be a perilous if not an impossible political exercise.

The next important issue in the debate on financial equalisation is how should the disparities be measured or what should be the level of fiscal equalising transfers? The concept of fiscal disparities and its measurement is complex and indeed controversial. Views of analysts have evolved over time. Initially, there is a need to distinguish between differences that result because of local choices in the fiscal expenditure mix from those that are arise due to low tax base and high fiscal needs, which are largely outside the control of sub-national governments. The latter is referred to as "disparities", arising because the capacity to raise revenue to finance publicly provided services and the amount needed to provide these goods is not matched [Ladd (1999)].

Literature on the design of equalisation transfers distinguishes between revenue equalisation and expenditure, or need, equalisation. The combination of both is referred to as need-capacity gap equalisation. Broadway and Flatters (1982), on economic efficiency grounds, advocate a focus on differences in net fiscal benefits across jurisdictions. They call for full equalisation of differences in tax revenues. Auld and Eden (1984) also conclude that revenue equalisation programs are consistent with economic theory.

However, proponents of the need to remove horizontal fiscal imbalances argue that equalisation transfers should consider both expenditure needs and revenue means in determining the equalisation entitlements [Musgrave (1961), Le Grand (1975), Shah (1994)]. The constraint is in the implementation of this principle. "The distinctions between differences in needs, costs and expenditures or the need-capacity gap, is far from evident and presents a great deal of conceptual and technical difficulties" [Dafflon (2007)].

According to Faber and Otter (2003) resource equalisation is an established policy in most decentralised and federal countries. Over the past few decades revenue equalisation has taken a wide variety of forms. Redistributive effects depend on the equalisation formula as well as the effects of the ceiling and floor provision. Also since beneficiary jurisdictions differ in size and population, the redistribution between jurisdictions must take into account the population of each jurisdiction. This is accounted for by focusing on per capita revenues. In this paper fiscal equalisation is measured on the basis of revenue equalisation.

3. INTERNATIONAL PRACTICES OF FISCAL EQUALISATION

In order to correct vertical and horizontal imbalances, both federations and decentralised unitary systems have made arrangements for financial transfers from one level of government to another. The relative size and structures of these transfers differ considerably. Because most central governments have control over the major tax sources, arrangements have usually taken the form of financial transfers to the states, although occasionally they have taken the form of some state transfers to central governments or inter-state transfers for equalisation purposes.

Table 1 gives an indication of the significance of total central transfers to correct both vertical and horizontal imbalances as a share of the total constituent unit revenues. This measures the extent of dependence of sub-national governments on transfers. It appears that dependence of states on transfers is generally higher in federations as compared to unitary governments and in transitional or new federations (like South Africa, Pakistan, India). Transfers to sub-national governments have generally taken various forms. The first is revenue sharing, that is, shares in the proceeds of specified central taxes. The second type is unconditional grants. The third is conditional grants for specific purposes requiring the recipient governments to meet certain conditions or to match from their own revenues the central grants. The extent to which these transfers have been used varies considerably.

Table 1

Central Transfers as Percent of Total Constituent Unit Revenues (States and Local)

Country	Total Transfers	Conditional Transfers
Mature Federations		
Australia	45.3	21.3
United States	29.6	29.6
Germany	43.8	9.8
Canada	19.8	15.8
Switzerland	24.8	17
Transitional Federations		
Pakistan	85.1	–
Spain	72.8	41.9
South Africa	96.1	11.0
Brazil	30.0	7.5
India	46.0	18.7
Mature Unitary Systems		
Japan	37.2	16.2
Sweden	15.8	4.4

Source: Watts (2005).

Revenue sharing is the most widespread practice. The Constitution stipulates sharing of key taxes in many countries. In Germany, for example, revenue from the central income taxes, corporation and turnover taxes are shared. In Australia, the Goods and Services Tax is transferred unconditionally to the states. In South Africa, revenue sharing is applied to all central taxes. In India, some duties (like stamp duties) are levied by the central government but are entirely collected and appropriated by the states. Some taxes are both levied and collected by the central government but the proceeds are assigned to those states in which they have been collected on the basis of the origin principle. As opposed to this, revenue-sharing also takes place on the basis of a distribution formula given frequently by constitutionally mandated quinquennial Finance Commissions.

Given that in many cases revenue-sharing of central tax proceeds has been constitutionally mandated, some analysts classify them as a form of state revenues rather than as a transfer. However, that can be misleading for, unlike their own taxes and user fees, the states have no control on the size of the revenues they will receive as this is determined by the rates and levels of central taxation. They are, therefore, better classified as transfers. They share the characteristics of unconditional central grants, but have the further advantage that instead of being determined as a fixed amount by the central government, they are based on a specified share of major taxes and, therefore, rise as the economy grows. This explains why they have been so widely used as the key mechanism to reduce inter-governmental fiscal imbalances.

The arrangements for removing or reducing horizontal imbalances among sub-national governments in some countries are set out in summary form in Box 1.

Box 1

Equalisation Arrangements

Switzerland	Federal transfers based on formulae involving a range of criteria ranking cantons by financial capacity as the basis for tax-sharing and conditional grants, but the equalising transfer system is smaller than in Germany, Canada and Australia.
Canada	Federal transfers: stand-alone equalisation scheme based on formula (adjusted from time to time) assessing provincial revenue capacity in terms of 33 provincial tax and non-tax revenue sources against a middle range five-province standard and providing unconditional grants representing 42 percent of all transfers.
Australia	Federal transfers: based between 1933 and 1981-82 on recommendations derived from determination of needs of claimant states by a standing independent Commonwealth Grants Commission; after 1981-82 took the form of adjustments to the general Adjustment Grant transfers based on calculation of relativities of expenditure needs among states; since 2000 based on application of relativities to distribution of central GST tax. Allocation by CGC based on calculation of revenue capacity and expenditure needs from comparisons of 18 revenue categories and 41 expenditure categories.

Germany	Primarily inter-state transfers (62 percent): equalisation through an inter-state revenue pool to which rich Lander pay and from which poor Lander draw according to a formula; plus federal transfers (38 percent): Federal Supplementary Payments of 1.5 percent of value-added tax (VAT). The primary per capita distribution of the shares of the Lander of a portion of the VAT also has an equalising effect.
India	Federal transfers from a pool of all union taxes supplemented by unconditional grants, based on the recommendations of quinquennial Finance Commissions recommending both the share to be allocated to the states as a group, and the allocation among states taking account of population, per capita income, area, economic and rural infrastructure needs, and tax effort.
Spain	Federal transfers: since 1987 criteria including population, size, personal income, fiscal effort, number of internal provinces within Autonomous Community, and distance to state capital; applied by federal government to shares of federal tax revenue transferred to Autonomous Communities.
Brazil	Distribution of state participation fund (state share of three main federal taxes) with participation coefficient for each state based mainly on redistributive criteria (85 percent of fund goes to poorer regions in the North, Northeast, and West-West). A similar fund for municipalities is less redistributive and more population based.
South Africa	General national revenue-sharing transfer, with National Government distribution of "equitable shares" among provinces following recommendations of Financial and Fiscal Commission based on demographic profiles of provinces comprising an education share, a health share, a social security share, and population, backlog, economic activity and institutional components.
Sweden	Cost equalisation transfers based on 15 indices: municipalities and country councils whose per capita income is below national average receive a grant and those above pay a fee (i.e. scheme is self-balancing), plus a supplementary block grant from the central government containing a population-related and age-related portion. Implemented by an Equalisation Commission.
Japan	Local Allocation Tax (the main central government unconditional revenue-sharing transfer) is distributed to local governments on a uniform formula based on basic financial need and basic financial capacity.

Source: Shah (1994).

4. A REVIEW OF THE NFC AWARDS

The history of revenue sharing in the sub-continent can be traced back to pre-partition days. Since partition, eight revenue-sharing awards have been announced in Pakistan. The first award was the Raisman award of 1951. This was followed by National Finance Commission awards in 1961-62, 1964, 1970, 1974, 1990, 1996, and 2009. The

1990 award was delayed for a considerable period. Two NFCs were formed in 1979 and 1985 but no awards were announced due to lack of consensus among the federating units. Similarly, NFCs were constituted in 2000 and then in 2005. Despite a number of meetings on both occasions, an award could not be agreed upon. Consequently, for the 2006 NFC all the provincial Chief Ministers vested the authority to the President to announce an award. As a result the President under Article 160(6) of the Constitution of Pakistan, through Ordinance No.1 of 2006, made amendments in the "Distribution of Revenues and Grants-in-Aid Order, 1997", with effect from July 1, 2006. The NFC Award of 2009 is an achievement of the current democratically elected government as a consensus has been achieved after a gap of over twelve years.

Divisible Pool Transfers: Table 2 gives composition of the divisible pool of taxes in terms of which taxes were shared and the proportion in which these were shared between the federation and the provinces combined in the last four Awards. It seems that the trend has been to increase the size of the divisible pool. The 1990 NFC award achieved this through inclusion of new taxes, specially excise duties on some commodities in the pool. The 1996 Award further strengthened the trend and included all federal taxes in the divisible pool. Since the divisible pool was substantially expanded, the share of provinces in the divisible taxes was reduced. The 2006 and 2009 NFCs have adopted the strategy of enhancing the provincial share in the divisible pool of taxes.

Table 2

Evolution of Divisible Pool in Various Awards

	Shared Revenue Sources[a]			
Divisible Pool	NFC 1990	NFC 1996	NFC 2006[d]	NFC 2009
a. Income Tax[b]				
Personal	80%	37.5%	45%-50%	56%-57 ½%
Corporate	80%	37.5%	45%-50%	56%-57 ½%
Wealth Tax	–	87.5%	45%-50%	56%-57 ½%
b. Sales Tax	**80%**	**37.5%**	**45%-50%[e]**	**56%-57½%[f]**
c. Excise Duties				
Tea	–	37.5	45%-50%	56%-57 ½%
Tobacco	80%	37.5%	45%-50%	56%-57 ½%
Sugar	80%	37.5%	45%-50%	56%-57 ½%
Betel nut	–	37.5%	45%-50%	56%-57 ½%
All excise duties (Excluding GST)	–	37.5%	45%-50%	56%-57 ½%
d. Export Duties				
Cotton	80%	37.5%	45%-50%	–
Jute	–	–	45%-50%	–
f. Estate and Succession Duties	**–**	**–**	**–**	**–**
g. Capital Value Tax on Immovable Properties	**–**	**37.5%**	**45%-50%**	**devolved to provinces**

a. Share of the provinces combined.

b. Excluding taxes on income consisting of remuneration paid out of federal consolidated fund.

c. Announced by the President.

d. Provincial share was decided to be 45 percent for 1st Financial year and would reach 50 percent with subsequent increase of 1 percent per annum.

e. Other than 1/5th of sales tax collected in lieu of zila/octroi transfer to be transfer to the province of origin.

f. Sales Tax on services devolved to provinces.

Overall, it appears there has been an effort towards fiscal decentralisation and of greater transfers to the provincial governments in Pakistan which have over the years played an increasingly important role in the provision of basic social and economic services like education, health, irrigation, roads etc. in the country.

Turning next to the revenue sharing formula between the provinces, revenues from the divisible pool of taxes have been distributed among provinces on the basis of their population. This has been fundamentally changed in the NFC Award of 2009, with provincial shares computed on the basis of multiple criteria of population, poverty/ backwardness, inverse population density (IPD) and revenue generation/ collection (see Table 3). In addition, the province of Khyber-Pakhtunkhwa (K-PK) has been given a 1 percent share in the divisible pool prior to distribution as compensation for costs of the War on Terror. For the first time, revenue sharing formula in the divisible pool is being used to ensure a degree of fiscal equalisation through the inclusion of indicators like backwardness/ poverty and IPD, although the criterion of revenue generation/ collection mitigates against this. The derived shares of the provinces are presented in Table 4.

Table 3

Revenue Sharing Formula Among Federating Units

Award	Tax	Sharing Criteria (Weight)
NFC 1990	Divisible Taxes	Population (100%)
NFC 1996	Divisible Taxes	Population (100%)
NFC 2006	Divisible Taxes	Population (100%)
NFC 2009	Divisible Taxes	Population (82%)
		Poverty (10.3%)
		Revenue (5%)
		IPD* (2.7%)

*Inverse Population Density.

Table 4

Shares of Provinces from the Divisible Pool in Various Awards

(Percent)

Province	NFC 1990	NFC 1996	NFC 2006	NFC 2009
Punjab	57.87	57.37	57.37	51.74
	(57.87)	(57.87)	(57.36)	(57.36)
Sindh	23.29	23.29	93.71	24.55
	(23.29)	(23.29)	(23.71)	(23.71)
KPK	13.54	13.54	13.82	14.62
	(13.54)	(13.54)	(13.82)	(13.82)
Balochistan	5.30	5.30	5.11	9.09
	(5.30)	(5.30)	(5.11)	(5.11)
Total	**100.00**	**100.0**	**100.0**	**100.0**

Figures in brackets are population shares according to the last Census conducted prior to the Award.

Straight Transfers: Besides divisible pool transfers, the federal government also makes straight transfers to the provinces. The institution of straight transfers from the federal to provincial governments of development surcharge on gas, excise duty on gas and crude oil and net hydel profits on the basis of collection initiated in 1990 NFC award has been taken forward by the subsequent NFCs. In the 1996 NFC award, royalty on gas and crude oil was also given to the provinces. In addition, Khyber-Pakhtunkhwa (K-PK) was receiving net hydel profits from WAPDA at a capped level of Rs 6 billion annually. The 2009 NFC resolved the outstanding issue of arrears of net hydel profits and development surcharge on gas. It also altered the basis of calculating straight transfers. As a proportion of inter-governmental transfers, straight transfers show a significant increase (see Table 5).

Table 5

Composition of Transfers from Federal to Provincial Governments

(Rs in Billion)

	Divisible Pool Transfers	Straight Transfers	Special Grants	Total
1990-91	32.1	1.7	–	33.8
	(95.0)	(5.0)	(–)	(100.0)
1991-92	47.5	16.3	2.0	65.8
	(72.2)	(24.8)	(3.0)	(100.0)
1996-97	119.2	18.2	2.0	139.4
	(85.5)	(13.1)	(3.0)	(100.0)
1997-98	104.0	20.3	7.4	131.7
	(79.0)	(15.4)	(5.6)	(100.0)
2005-06	244.6	62.8	8.7	316.0
	(77.4)	(19.9)	(2.7)	(100.0)
2007-08	403.1	70.6	33.0	506.7
	(79.6)	(13.9)	(6.5)	(100.0)
2009-10	574.1	87.2	57.8	689.0
	(80.0)	(12.1)	(7.9)	(100.0)
2010-11	865.8	197.0*	6.0	1068.7
	(81.0)	(18.4)	(0.6)	(100.0)

Figures in parenthesis give share in total transfers.
*Inclusive of arrears and the sales tax on services like telecommunications.

Grants/Subventions*:* Besides revenue sharing from the divisible pool and straight transfers, inter-governmental transfers have also taken the form of unconditional grants in Pakistan. The 1990 NFC Award gave grants to the provinces to finance their revenue deficits. This created an incentive for provinces to increase their revenue deficits, undermining key principles of financial responsibility and fiscal prudence. The 1996 NFC award promoted the concept of grants/subventions for fiscal equalisation to smaller provinces. Special grants were given to the two smaller provinces equivalent to Rs 3.3 billion for K-PK and Rs 4 billion for Balochistan. These grants, which were inflation indexed, were given for five years. Incentive of matching grants for higher fiscal effort to provincial governments was also introduced, subject to own revenue growth exceeding 14.2 percent. A maximum limit was, however prescribed for the matching grant.

In the 2006 NFC award, total subvention/grants for provinces were enhanced from Rs 8.7 billion to Rs 27.7 billion, with the provision for further increases linked to growth of net proceeds in the divisible pool. Punjab and Sindh which were not given any grants in the 1996 award, were entitled to receive Rs 3.1 and Rs 5.8 billion respectively along with Rs 9.7 billion and Rs 9.2 billion respectively for KPK and Balochistan. By 2009-10

these grants and subventions had increased almost 58 billion. The 2009 NFC has discontinued the use of grants/ subventions as a mechanism of transfers. Only Sindh is getting a Rs 6 billion grant in lieu of abolition of octroi/zila tax grant.

In conclusion, it appears that, by and large, intergovernmental transfers between the federation and federating units has evolved within the broad, highly progressive overriding philosophy of promoting fiscal decentralisation. However, the revenue sharing formula to meet the differential needs of the provinces remained stagnant for a number of years and whatever changes were made were ad-hoc and opaque. Fiscal equalisation was based primarily on adhoc grants/ subventions. The 2009 NFC Award has initiated the practice of building in fiscal equalisation explicitly in the revenue sharing formula. It, therefore, becomes important to see whether or not intergovernmental transfers have been successful in addressing the issue of horizontal inequalities across provinces.

Provincewise Trend in Federal Transfers

The Provincial shares in total federal transfers are presented in Table 6 in the last four NFC awards, for years just before and after a particular award. Clear patterns emerge from the Table. First, the share of the largest province-Punjab has declined over time. Punjab received over 55 percent of federal transfers just prior to the 1990 NFC award. Thereafter its share has declined, showing temporary recovery prior to the 1996 NFC award. The share of Sindh has increased significantly in the late 90s and in the earlier part of last decade. KPK's share in transfers peaked after to the 1990 NFC award, increasing to 19 percent, and has declined thereafter. The 1996 NFCs did attempt to restore the province's share but the 2006 arrangements further lowered it. The 2009 NFC attempts to redress this. As far as Balochistan is concerned, both the NFCs of 1990 and 1996 had enhanced the share in federal transfers to above 11 percent but this trend has not been maintained subsequently.

Table 6

Share in Total Transfers by Province

(Percent)

	1990-1991	1991-1992	1996-1997	1997-1998	2005-2006	2007-2008	2009-10	2010-11
Total Federal Transfers (Rs in Billion)	33.8	65.8	139.4	131.7	316.0	506.7	718.3	1068.7
Punjab	55.3	45.1	51.3	47.0	47.1	47.3	47.2	46.7
Sindh	24.0	23.9	24.9	23.8	30.1	29.8	29.3	26.7
KPK	12.7	19.0	15.9	17.8	14.4	14.8	15.2	17.1
Balochistan	7.9	12.0	7.9	11.4	8.4	8.0	8.3	9.5
Pakistan	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 7

Relative Per Capita Transfer by Province*

	1990-91	1991-92	1996-97	1997-98	2005-06	2007-08	2009-10	2010-11
Punjab	0.953	0.778	0.884	0.810	0.821	0.824	0.822	0.815
Sindh	1.030	1.026	1.069	1.021	1.270	1.257	1.235	1.127
KPK	0.948	1.418	1.186	1.328	1.043	1.072	1.099	1.234
Balochistan	1.453	2.264	1.491	2.151	1.647	1.569	1.565	1.857
Pakistan	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

*Ratio of share in transfers to share in population.

Given this pattern and trend, what do these transfers imply in terms of relative per capita transfers to each province? Table 7 gives the relative per capita transfers (defined as ratio of share in transfers to share in population). It appears that Punjab has always been getting less than its population share. Sindh has always had a share higher than its population, and its relative per capita transfer has, more or less, systematically increased over time except in the latest Award. Per capita transfers to KPK demonstrate a varying trend, increasing after to the 1990 and 1996 NFC awards, and declining thereafter till the 2009 NFC award. Balochistan has always received a higher per capita transfer than any other province. However, the magnitude of the transfer has varied, increasing to a high of 2.26 in 1991-92.

Interestingly, per capita transfers to the smaller provinces have been the highest in the immediate aftermath of NFC awards. This implies that the awards by and large, have made an effort to compensate the smaller provinces for their limited fiscal capacity. The only exception is the 2006 ad-hoc revenue sharing arrangements when the change in relative per capita transfer to the smaller provinces was either minimal (KPK) or negative (Balochistan). As such, it is not immediately clear what the trend in fiscal equalisation has been in Pakistan. To answer this question we develop a Fiscal Equalisation Index (FEI) in the next section.

5. THE FISCAL EQUALISATION INDEX [FEI]

The Gini Coefficient based on the Lorentz curve has traditionally been used to quantify the extent of income inequality. We use a similar technique to determine the extent of fiscal equalisation achieved by transfers. This requires a comparison of the cumulative share in transfers of provinces in ascending order of development with the corresponding cumulative share in population. This is diagrammatically shown in Figure 1.

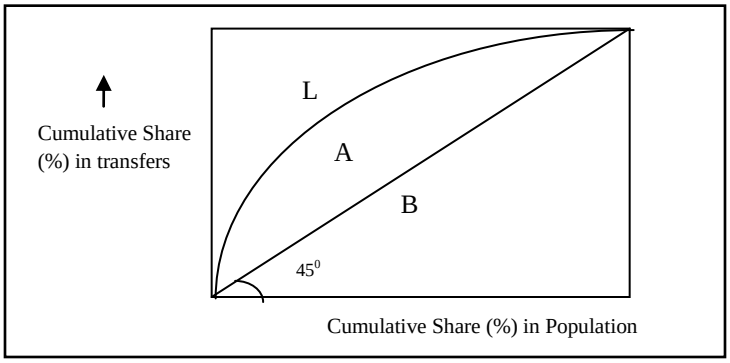

Fig. 1.

If curve L lies for the most part above the 45^0 line then this indicates that fiscal equalisation is taking place. This requires computation of the area A below the curve L, for which we designate the following:

S_B, S_K, S_P, S_S	Share of Balochistan, K-PK, Punjab and Sindh respectively in transfers
P_B, P_K, P_P, P_S	Share of Balochistan, K-PK, Punjab and Sindh respectively in population

It is assumed that in the ascending order of level of development we have Balochistan, K-PK, Punjab and Sindh. This is justified in Box 2.

Box 2

Development Ranking of Provinces

For estimation of the FEI, we need the ranking of provinces in terms of level of development. Sindh appears as the most developed province in almost all development indicators, with the exception of Human Development Index (HDI). Also, KPK and Balochistan interchange to occupy the third and the fourth rank in different indicators. Therefore, the ranking of provinces in ascending order of development is Balochistan, K-PK, Punjab, Sindh.

	Development Ranking of Provinces					
	Average Household Income [a]	Per Capita GDP[b]	Human Development Index[c]	Deprivation Index[d]	Incidence of Poverty[e]	Vulnerability to Poverty[f]
Punjab	II	II	I	II	II	II
Sindh	I	I	II	I	I	I
K-P-K	IV	III	III	IV	IV	III
Balochistan	III	IV	IV	III	III	IV

[a] According to Household Income and Expenditure.
[b] According to Bangali, (2003).
[c] According to Hussain, (2003) and Jamal, (2007).
[d] According to Jamal, (2007).
[e] According to Asian Development Bank (2003).
[f] According to Jamal, (2007).

The Area A is derived as follows:

$$A = S_B\left[\frac{1}{2}P_B + P_N + P_P + \frac{1}{2}P_S\right] + S_N\left[\frac{1}{2}P_N + P_P + \frac{1}{2}P_S\right] + S_P\left[\frac{1}{2}P_P + \frac{1}{2}P_S\right] + \frac{1}{2}P_S.100 \quad (1)$$

The Fiscal Equalisation Index, *FEI*, is then derived as

$$FEI = \frac{B - A}{B}$$

or $$FEI = 1 - \frac{A}{B} \quad \text{... … … … … … …} \quad (2)$$

Where $$B = \frac{1}{2}(100)(100) = 5000$$

In the event of perfect fiscal equalisation where all the transfers accrue to the least developed province, we have that

A = (100)(100) = 10000

and *FEI* = –1.

With some fiscal equalisation,

A>B

and –1 < *FEI* < 0

Alternatively, if there is perfect disequalisation and the most developed province receives all the transfers then

$A = O$

and $FEI = 1$

Therefore, there is fiscal disequalisation when

$O < FEI < 1$

6. TREND IN THE FISCAL EQUALISATION INDEX

Based on the methodology described earlier, we have estimated the FEI for the years just before and after the last four NFC awards. Table 8 highlights that federal transfers had ceased to achieve the most important objective of fiscal equalisation by 2005-06, prior to the 2006 Presidential order. The adhoc Presidential order did not reverse the trend, but in fact, strengthened it. The FEI for overall federal transfers has changed from –0.012 to 0.014 during the last decades. The table clearly reveals that the two awards—NFC 1990, 1996—were fiscally equalising, with 1990 NFC award being somewhat more equalising than the 1996 NFC award. Thereafter, we see that the index has changed sign and has become positive, indicating that federal transfers by 2005-06 had become fiscally disequalising. The NFC award of 2009 has, however, reversed the trend and contributed to some fiscal equalisation.

Table 8 also presents the FEI index by type of transfer. A number of important insights emerge from the analysis. First, divisible pool taxes, which account for bulk of federal transfers have historically been fiscally neutral, being distributed on the basis of population. However, the 2006 ad-hoc arrangements, which allocated part of sales tax (1/6 allocated in lieu of octroi/zila tax) on the basis of collection, has titled it marginally to being fiscally disequalising. It benefited Sindh, in particular, to the detriment of KPK and Balochistan.

The 2009 NFC makes the divisible pool transfers fiscally equalising for the first time in the fiscal history of the country. This is because of the inclusion of the development indicators in the revenue sharing formula. Second, straight transfers were playing an important role in fiscal equalisation upto 1997-98, i.e. till after the 1996 NFC award. Thereafter these transfers have become an important source of inequality in federal transfers. The growth in the share of straight transfers, especially gas-related revenues to Sindh has resulted in a dramatic fall in the share of KPK and Balochistan in straight transfers.

Table 8

Fiscal Equalisation Index (FEI) Before and Afterwards

	1990-91	1991-92	1996-97	1997-98	2005-06	2007-08	2009-10	2010-11
Divisible Pool Transfers	0.000	0.000	0.000	0.000	0.000	0.018	0.020	–0.068
Straight Transfers	–0.252	–0.347	–0.220	–0.206	0.208	0.173	0.162	0.007
Special Grants	–	0.123	0.123	–0.632	–0.864	–0.420	–0.443	0.763
Total	**–0.012**	**–0.084**	**–0.026**	**–0.067**	**0.017**	**0.011**	**0.014**	**–0.061**
Δ Due to the Award	**–0.072**		**–0.041**		**+0.06**		**–0.075**	

*Ratio of share in transfers to share in population.

The 1996 NFC increased the importance of special grants and employed them as a principal tool for achieving horizontal equity, as these were given only to the two smaller provinces of KPK and Balochistan. Special grants in the 2006 Ad-hoc arrangements were also given to Sindh and Punjab which somewhat mitigated the equalising influence of these transfers as is reflected by the decline in the absolute magnitude of the FEI in 2007-08 as compared to just before the award (see Table 8).

Our analysis also clearly indicates that NFC awards have to be announced in a timely fashion. Fiscal equalisation breaks down or is significantly dampened close to the end of tenure of an award as the transfers fail to meet the resource needs of the relatively backward provinces. This is demonstrated by the FEI in the last year just prior to the year when the award is due. Lack of consensus among the federating units and the inability to agree upon an award leads to distortions and exacerbates fiscal inequalities. Timely announcement of appropriately designed revenue sharing awards promotes an important government objective of distribution of resources necessary for equitable provision of basic social and economic services. To ensure this, the NFC Secretariat at the Ministry of Finance has to be strengthened with capacity to collect data on basic indicators and undertake analysis such that the NFC deliberations are supported by more technical analyses and there is more frequent monitoring of the consequences of an award.

To derive which NFC award represents the biggest change in fiscal equalisation, we have computed the change in FEI due to the award. The largest change has occurred after the 2009 NFC award. This implies that the award has made the biggest effort to redress the imbalance caused by the Presidential Order of 2006.

7. CONCLUSIONS

This paper analyses the last four NFC revenue sharing arrangements from the viewpoint of achieving fiscal equalisation. Construction of the FEI, perhaps for the first time, provides clear conclusions. There was, in fact, a breakdown in fiscal equalisation in Pakistan prior to the 2009 NFC Award. The Ad-hoc award of 2006 announced by the then President had clearly failed to improve equity in intergovernmental revenue transfers and had, therefore, been unsuccessful in achieving its basic objective. The 1990 NFC award followed by 1996 and the 2009 NFC awards have, however, contributed to fiscal equalisation.

Results show that the 2009 NFC award has brought about the highest change in the FEI and therefore has made the biggest effort at ensuring equalisation of revenues. Future NFCs will have to not only strengthen the trends but also have to ensure timely announcement of awards as our results shows dampening of fiscal equalisation towards the end of the tenure of a particular award. The deliberations will have to be supported with better and more accurate data bases and analyses on indicators and on incidence of the federal taxes.

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Fiscal Policy and Current Account Dynamics in the Case of Pakistan

ATTIYA Y. JAVID, MUHAMMAD JAVID, and UMIAMA ARIF

1. INTRODUCTION

The relationship between fiscal policy and the current account has long attracted interest among academic economists and policymakers after introduction of the standard intertemporal model of the current account by Sachs (1981) and its extension by Obstfeld and Rogoff, (1995) in open economy macroeconomics. There are two major strands of the current account literature Mundell-Fleming [Mundell (1968) and Fleming (1967)] and Ricardian equivalence [Barro (1974, 1989)] to explain such variations in the deficits. According to Mundell-Fleming model budget deficits cause current account deficits through stimulating income growth or exchange rate appreciation [Darrat (1988); Abell (1990); Bachman (1992) and Bahmani-Oskooee (1992)]. On the other hand, there is Ricardian view that the financing of budget deficits, either through reduced taxes or by issuing bond does not alter present value wealth of private households since both temporarily reduced taxes and issuance of bonds represent future tax liabilities [Kaufmann, *et al.* (2002); Evans (1989); Miller and Russek (1989); Enders and Lee (1990) and Kim (1995)]. The underlying reason is that the effects of fiscal deficits on the current account depend on the nature of the fiscal imbalance. For example, in a simple theoretical model in which Ricardian equivalence holds, a cut in lump sum taxes and the ensuing fiscal deficit would not affect the current account as the private savings increase will offset the fiscal deficit but investment will be unchanged. Conversely, a transitory increase in government spending will increase both the fiscal deficit and the current account deficit, a case of twin deficits. And a permanent increase in government spending will have no effects on the current account while its effects on the fiscal balance will depend on whether the extra spending is financed right away with taxes (in which case the fiscal balance is unchanged) or whether it is financed with debt (future taxes) in which case the fiscal balance worsens. Thus, fiscal deficit may or may not lead to current account deficits depending on the nature and persistence of the fiscal shock. There is also a third scenario relate to Recardian view that portrays the possibility of negative relationship between the deficits where, for example, output shock give rise to endogenous movements and two deficits are divergent.

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There are various channels that explain theoretically the impact of fiscal policy on the current account. The direct channel through which fiscal policy affects the current account is by changes in the government's consumption or investment demand for tradable goods which shift the government import demand function and causes changes in the trade balance. In a Keynesian framework a fiscal expansion (a tax reduction or spending increase) tend to increase demand including demand for imports, and hence the trade deficit. Fiscal policy can also affect the current account by changing the relative price of non-tradables which induces higher government spending on non-tradable causing a real appreciation, more private consumption of non-tradable and less production of tradable leads to deterioration of current account. Fiscal contraction can reduce interest rates, including on external debt, thereby improving the current account balance. At the same time, lower risk premium can also increase capital inflows, which can boost demand and real appreciation pressures and eventually worsens the current account. Fiscal expansions have opposite effect if they are unsustainable can generate capital flight and force a rapid external account adjustment which can be the case of balance of payments crises. However, the relative strength of these mechanisms, and thus the net impact of fiscal policy on the current account is determined by model assumptions and empirically depend on country characteristics [Abbas, *et al*. (2010)].

The present study empirically examines the relationship between fiscal policy and the current account for Pakistan. In Pakistan where fiscal and current account imbalances are large, a question arises to what extent fiscal adjustment can contribute to resolving external imbalances.[1] Some studies are done to explore the link between fiscal deficits and current account deficits [Zaidi (1995); Burney and Akhtar (1992) and Burney and Yasmeen (1989)] and analysing the possible causal relation 'twin deficit' hypothesis [Kazimi (1992); Aqeel and Nishat (2000) and Hakro (2009)]. However this issue needs to be further investigated from policy point of view, because the fiscal and current account balances seem to be highly persistent and causing other macro economic imbalances and indebtedness, thus persistent deficits become a major cause of concern in Pakistan. The present study contributes to the existing empirical literature by analysing the impact of fiscal policy on the current account for a developing economy. The study examines the dynamic interactions among variables: fiscal policy, current account and other variables, output, exchange rate and interest rate using a structural VAR model. Blanchard and Perotti (2002) suggest that the structural VAR approach seems more suitable for the study of fiscal policy than of monetary policy.[2]

[1]Budget deficits in 80s average is nearly 6 percent of GDP, it increases to 6.9 percent in 90s and fell down to 4.3 percent in 2000- 01, rises again to 4.3 percent of GDP in 2005-06, in 2008-09 it is 5.2 percent of GDP. The current account deficit in 80's average is 3.9 percent of GDP, in 90s it is 4.5 percent and in 2000-01 it fell down 0.7, and it rises again in 2005-06 to 4.4 and in 2008-09 it is 5.7 percent of GDP, see Economic Survey (2009-10).

[2]They argue that there are many factors which contribute to the movement in budget variables, in other words, there are exogenous (with respect to output) fiscal shocks. In addition, decision and implementation lags in fiscal policy imply that there is little or no discretionary response of fiscal policy to unexpected movements in activity. Thus, with enough institutional information about the tax and transfer systems and the timing of tax collections, one can construct estimates of the automatic effects of unexpected movements in activity on fiscal variables, and, by implication, obtain estimates of fiscal policy shocks.

The study is organised as follows. Section 2 discusses the theoretical and empirical literature on this area briefly. The methodology and data is presented in Section 3. The empirical results are discussed in Section 4 and last section concludes the study.

2. LITERATURE REVIEW

The past three decade has seen a strong increase in theoretical and empirical work on the dynamics of fiscal and the current account deficit. There are two strands of the current account literature. First, some findings of the literature focused on the budget deficit as a major cause of current account deficits called twin deficits. Whereas, Ricardian states that either ways of financing the budget deficits (through reduced taxes or by issuing bonds) do not alter present value wealth of private households. Financing budget deficits by issuing bonds leads to higher consumption expenditures due to wealth effects and raises interest rates, higher interest rates appreciate the currency, and, because of loss in competitiveness in addition to higher consumption, worsen the current account balance. Both approaches share an intertemporal perspective on the current account, which is regarded in both cases as net savings of the economy.

The traditional Keynesian models, optimising real business cycle models and new open-economy macro models are mostly come up with similar conclusions described as a transitory fiscal expansion is likely to lead to a fiscal deficit, a current account deficit, and an appreciation of the real exchange rate in the short run. The effects on the real exchange rate may be reversed in the long run and even the current account may revert over time to insure the solvency of the country's external liabilities. However, the impact and short-term effects of the fiscal shock are likely to be a worsening of the current account and a real appreciation. However, Baxter (1995) in framework of optimising real business cycle models come up with different results that a transitory tax rate cut can lead to current account improvement though intertemporal substitution effects that lead private saving to respond more than the initial government deficit. New open-economy macro models like Obstfeld and Rogoff (1995) also suggest that permanent government spending shocks may lead to a short-run demand-driven increase and cause shift in the net output that, improves the current account and depreciates the real exchange rate.

There are three distinct approaches that have been widely employed in the empirical literature. The first approach analyses the impact of fiscal policy on external imbalances using causality tests and structural Vector Autoregressive (VAR) models. The second followed the long-term correlation between indicators of fiscal policy and external imbalances, using cointegration techniques, and single or panel regressions techniques. The third approach invokes the narrative approach to identify exogenous changes in fiscal policy and uses regression analysis to study their impact on external imbalances.

In VAR analysis an important methodological choice is how to identify exogenous fiscal shocks; one choice is to use changes in the log of real government consumption, because this measure is less affected by changes in GDP than is the case for alternatives such as the overall deficit/GDP ratio or the ratio of real government consumption to GDP. For selected EU countries, Beetsma, *et al*. (2007) find that a government spending innovation worsens the trade balance and appreciates real effective exchange rate concluding that the main short-term transmission channel impact is upon output, with the

real exchange rate playing a greater role over longer horizons. Monacelli and Perotti (2007) find that, following an increase in real government consumption, the trade balance stays around trend initially, but improves after about 3 years for US. They find stronger evidence in support of the twin deficits hypothesis in the United Kingdom, Australia, and Canada. Corsetti and Muller (2006) report that the impact of fiscal shocks on the current account seems to be greater and longer-lasting in economies where total trade is higher as a share of GDP (Canada and the United Kingdom) than in economies where trade is a smaller share of GDP (US and Australia).

To analyse this issue on a set of countries using panel regressions some studies are done and find a statistically significant impact of fiscal variables on external imbalances. Most recent among these studies is by Abbas, *et al*. (2010) examine the determinants of the current account for 135 countries during 1975–2004 using random effects GLS regressions, and report a positive association on the fiscal balance. Few studies are done to analyse this issue on a set of countries using panel regressions and find a statistically significant impact of fiscal variables on external imbalances. Leigh (2008) finds that a increase in government consumption is related with an appreciation of the equilibrium real exchange in case of both developing and advanced economies by using panel estimation. The actual impact on the current account could vary depending on the dynamic adjustment path of the actual real exchange rate toward the equilibrium; large current account worsening can obtain if the real exchange rate appreciates above its equilibrium level that is overshooting. Mohammadi (2004) finds broadly symmetrical impact for fiscal expansions and contractions for a sample of 20 advanced and 43 emerging and developing economies that a tax-financed spending increase is associated with a current account worsening both for developing and developed countries and the current account balance worsens more if the spending is bond-financed in case of developing economies rather than developed ones. The study done by Khalid and Guan (1999) does not support any long-run relationship between the current account deficit and the fiscal deficit for advanced economies, while the data for developing countries does not reject such a relationship. However, their results suggest a causal relationship between the fiscal and current account balances for most countries in their sample, running from the budget balance toward the current account balance.

Romer and Romer (2007) have adopted narrative analysis to distinguish tax policy changes resulting from exogenous legislative initiative targeting, for example, reducing an inherited budget deficit, or promoting long-run growth from changes driven by prospective economic conditions, countercyclical actions, and government spending. They use the narrative record, presidential speeches, executive branch documents, and Congressional reports to identify the size, timing, and principal motivation for all major postwar tax policy actions to investigate the impact of exogenous changes in the level of taxation on economic activity in the U.S. The results indicate that exogenous tax increases are highly contractionary as indicated by negative effect on investment, investment spending turns out an important current account determinant and there exist a strong association between fiscal contraction and current account improvements. Feyrer and Shambaugh (2009) estimate that one dollar of unexpected tax cuts in the U.S. worsens the U.S. current account deficit by 47 cents by using Romer and Romer (2007) data. The results of these studies seem to suggest that the association between fiscal

imbalance and current account might be an issue for emerging economies more than for developed ones where both imbalances are rising. This motivates to investigate systematically the dynamic interactions between these two fiscal deficit and current account deficit using the structural VAR model in case of Pakistan.

The study is organised as follows. Section 2 discusses the theoretical and empirical literature on this area briefly. The methodology and data is presented in Section 3. The empirical results are discussed in Section 4 and last section concludes the study.

3. METHODOLOGY AND DATA

Fiscal policy and the current account are related through the identity

$CA = (Spr - Ipr) + (Sg - Ig)$

where *CA* is the current account, *Spr* and *Ipr* are private savings and investment, respectively; and *Sg* and *Ig* are government savings and investment. *Sg – Ig* is equivalent to the fiscal balance. The same identity holds, and is often used, in terms of shares of GDP. Various theoretical studies have sought to find out the mechanisms whereby fiscal policy would affect the terms in the identity above, and to assess the net implications for the current account.

Following Blanchard and Perotti (2002) this study employs structural VAR analysis. Let X_t a vector of macro variables: log of the real GDP, a government budget deficit as a percentage of GDP, the current account as a percentage of GDP, the treasury bill rate adjusting for inflation as real interest rate and exchange rate. The study of the dynamic response of shifts in fiscal policy on current account is typically carried out by estimating a VAR of the following form.

The reduced-form VAR can be written as

$$X_t = u_0 + u_1(t) + A(L)X_{t-1} + U_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Where X_t = [*RGDP*, *BD*, *CUR*, *RIR*, *ER*) is five dimensional vector of endogenous variables consisting of the log of the real GDP (GDP), a government budget deficit (BD) as a percentage of GDP, the current account as a percentage of GDP (CUR), real interest rate (RIR) and exchange rate (ER); the *A(L)* is an autoregressive lag polynomial, u_0 is a constant, *t* is a linear time trend. The vector $U_t = (u_t^{GDP}, u_t^{DB}, u_t^{CUR}, u_t^{RIR}, u_t^{ER})$ contains the reduced-form residuals, which in general will have non-zero correlations. As the reduced-form disturbances will in general be correlated it is necessary to transform the reduced-form model into a structural model. Pre-multiplying the Equation (1) by the (kxk) matrix A_0 gives the structural form

$$A_0X_t = A_0u_0 + A_0u_1 + A_0A(L)X_{t-1} + Be_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

where $Be_t = A_0u_t$ describes the relation between the structural disturbances e_t and the reduced-form disturbances u_t. In the following, it is assumed that the structural disturbances e_t are uncorrelated with each other, i.e., the variance-covariance matrix of the structural disturbances Σe is diagonal. The matrix A_0 describes the contemporaneous relation among the variables collected in the vector X_t. In the literature this representation of the structural form is often called the *AB* model [Blanchard and Perotti (1999)]. Without restrictions on the parameters in A_0 and *Bt* this structural model is not identified.

The recursive approach restricts B to a k-dimensional identity matrix and A_0 to a lower triangular matrix with percent diagonal, which implies the decomposition of the variance-covariance matrix $\Sigma_u = A_0^{-1}\Sigma_e(A_0^{-1})'$. This decomposition is obtained from the Cholesky decomposition $\Sigma_u = PP'$ by defining a diagonal matrix D which has the same main diagonal as P and by specifying $A_0^{-1} = PD^{-1}$ and $\Sigma_e = DD'$ i.e. the elements on the main diagonal of D and P are equal to the standard deviation of the respective structural shock. The recursive approach implies a causal ordering of the model variables. Note that there are $k!$ possible orderings in total.

In this study real GDP is the key macro variables showing the general economic performance, and is included to control the cyclical components of the government budget deficit. RIR is also an important macro variable that may provide an important clue on the transmission of the fiscal policy, and that may be related to monetary policy actions which the study also uses as to control variable. The order of the identification scheme uses a recursive model in which the ordering of the variables is {GDP, DB, CUR, RIR, ER}, where the contemporaneously exogenous variables are ordered first. In the model, the (exogenous) fiscal deficit shocks are extracted by conditioning on the current and lagged GDP and all other lagged variables. The real GDP ordered first, then comes the government fiscal deficit because budget deficit is likely to be endogenously affected by the current level of general economic activities during a year. In particular, government revenue part such as sales tax is very likely to depend on the current level of economic activities.

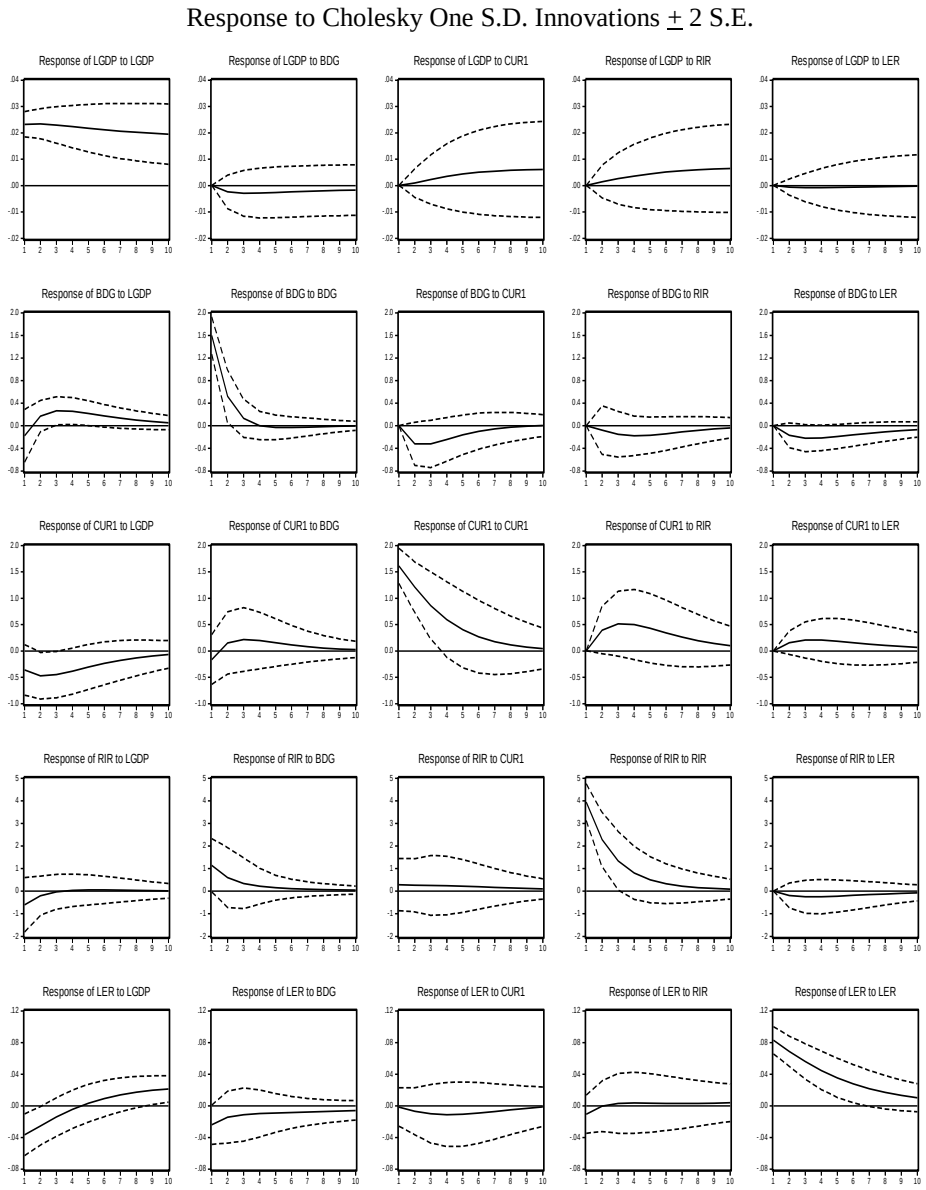
$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ \gamma_{BD,GDP} & 1 & 0 & 0 & 0 \\ \gamma_{CUR,GDP} & \gamma_{CUR,BD} & 1 & 0 & 0 \\ \gamma_{RIR,GDP} & \gamma_{RIR,BD} & \gamma_{RIR,CUR} & 1 & 0 \\ \gamma_{ER,GDP} & \gamma_{ER,BD} & \gamma_{ER,CUR} & \gamma_{ER,RIR} & 1 \end{bmatrix} \begin{bmatrix} u_t^{GDP} \\ u_t^{BD} \\ u_t^{CUR} \\ u_t^{RIR} \\ u_t^{ER} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} e_t^{GDP} \\ e_t^{BD} \\ e_t^{CUR} \\ e_t^{RIRt} \\ e_t^{ER} \end{bmatrix}$$

4. EMPIRICAL RESULTS

This section present the analysis of real GDP, current account deficit and fiscal policy shocks through impulse response function generated through the identification scheme of structural VAR proposed by Sims (1980) extended to fiscal shocks suggested by Blanchard and Perotti (2002) and Kim and Roubini (2008) as discussed above.

Figure 1 shows the impulse responses of each variable to each structural shock over ten years, with one standard error bands. The effects of output (GDP) shocks give important insights. In response to a positive output shock, the government budget deficit decreases (or the government budget improves) for two years, consistent with the automatic-stabilisation role of government budget or the pro-cyclical behaviour of government budget. In response to a positive output shock, the current account worsens up to three years, remains negative thereafter, the exchange rate depreciates, and the real interest rate increases. This counter-cyclical current account movement is consistent with traditional theories of current account where an increase in output increases the demand

for foreign goods and worsens the current account. In terms of modern theories of the current account, the output shocks may be regarded as a productivity shock; a positive persistent productivity shock may increase investment strongly and worsen the current account, which generates a counter-cyclical behaviour of current account, as suggested by Mendoza (1991) and Backus, *et al.* (1992) and Kim and Roubini (2008).



Note: The SVAR model is estimated with one lag and a constant.

Fig. 1. Effect of Budget Deficit Shock

The ordering is real GDP, budget deficit, current account deficit, real interest rate and exchange rate

An increase in the real interest rate is also a likely response to a positive, persistent productivity shock which is consistent with the results of Kim and Roubini (2008), King and Rebelo (1999). The exchange rate depreciation is also consistent with theoretical models suggested by Finn (1998) and empirically supported by Kim and Roubini (2008). The impulse responses dynamics is consistent with the view called twin divergence by Kim and Roubini (2008) that output fluctuations generate a negative comovement between the current account and the government saving: a positive output shock worsens the current account while improving the fiscal balance. These results also reveal that the model properly accounts for the endogenous current account and government deficit movements especially those driven by business cycle fluctuations of output, which supports in examining the causal relation between the exogenous budget deficit shocks and the current account.

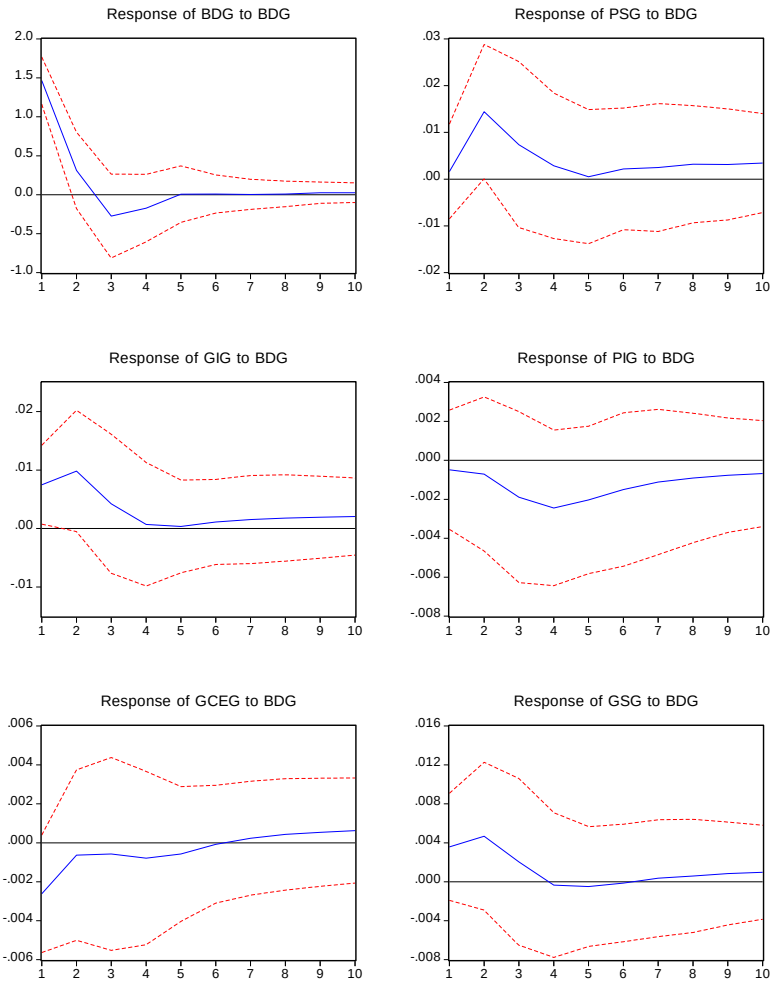
The main issue to investigate is fiscal policy shocks and results are presented in column 2 about the response of other variables to budget deficit shocks. In response to a positive budget deficit shock, output increase persistently, the current account, improves the exchange rate depreciates persistently and the real interest rate increases. These effects on the current account are according to the standard prediction of the most theoretical models.

As regards the effects of other structural shocks, a positive shock to the real interest rate leads to an output decrease that increases the government deficit, exchange rate depreciation and current account improvement in short run and a long-run worsening. The real interest rate shocks may be considered as proxy for monetary policy shocks, since the monetary authority is controlling the short-term real interest rate by changing the nominal interest rate given the inflation rate as in sticky price models. The impulse responses to real interest rate shocks are consistent with such an interpretation; a monetary contraction that is an increase in the real interest rate leads an increases the government deficit, and a real exchange rate appreciation. The current account response, a short-run improvement and a long-run worsening, is also similar to the effects of monetary policy shocks in the previous studies such as Kim and Roubini (2008); short-run income absorption effect and long run expenditure switching effect based on the traditional sticky price model and the interplay of saving and investment based on the intertemporal model can explain the current account dynamics, as interpreted by Kim (2001, 2008). On the other hand, a positive shock to the exchange rate (depreciation) improves the current account, which is consistent with the expenditure-switching effect.

4.1. Effect of Budget Deficit on Components of Current Account

To examine how each component of the current account responds to the government budget deficit shock, four components: private saving (PSG), private investment (PIG), government investment (GIG), government saving (GSG) and government consumption expenditure (GCEG) all as percent of GDP are used.

Figure 2 illustrate the results of impact of components of current account in response to budget deficit shock.



Note: The effect of budget deficit shock on the component of current account (CAC) including Private saving, private investment, Government investment. The ordering is real GDP, budget deficit BD, current account components CAC, real interest rate RIR and exchange rate ER.

Fig. 2. Effect of Budget Deficit Shock on Components of Current Account

In response to government deficit shocks (government saving decreases), private saving increases to almost fully compensate the government saving decrease, this result supports the Ricardian effect, but such an effect is partial: consumption increases a bit in the short run and the private saving increase is smaller than the government deficit increase. In addition, government deficit shocks crowd out private investment in the short run, which may be a result of an increase in the real interest rate. Overall, the private saving increase and the private investment increase outweigh the government deficit increase in the short run. As a result, the current account improves in the short-run.

4.2. Component of the Government Budget Deficit

In this section the impact of component of budget deficit shock that is the government spending and taxes both as ratio to GDP are assessed. Although both may increase the government deficit, however, the effects of shocks to government spending and taxes on the current account can be different [Baxter (1995) and Blanchard and Perotti (1999)] and suggest that a temporary tax rate cut may improve the current account while positive spending shock has opposite effect. Therefore, it is needed to test whether separate shocks to government spending and taxes can explain the results found above.

As regards, the effects of government spending or government purchase shocks. Blanchard and Perotti (1999), Fatas and Mihov (2001) and Javid and Arif (2010) also assumed that government spending is contemporaneously exogenous to other variables in the system. However, this study extend the basic model using government spending and taxes as percentage of GDP, model becomes {LGDP, LGCEC, CUR1, PIG}. To examine the effects of tax shocks as the government budget deficit shocks, {LGDP, TAX, CUR1, RIR, LER}. The results on the effects of the government spending and tax shocks are reported in Figure 3.

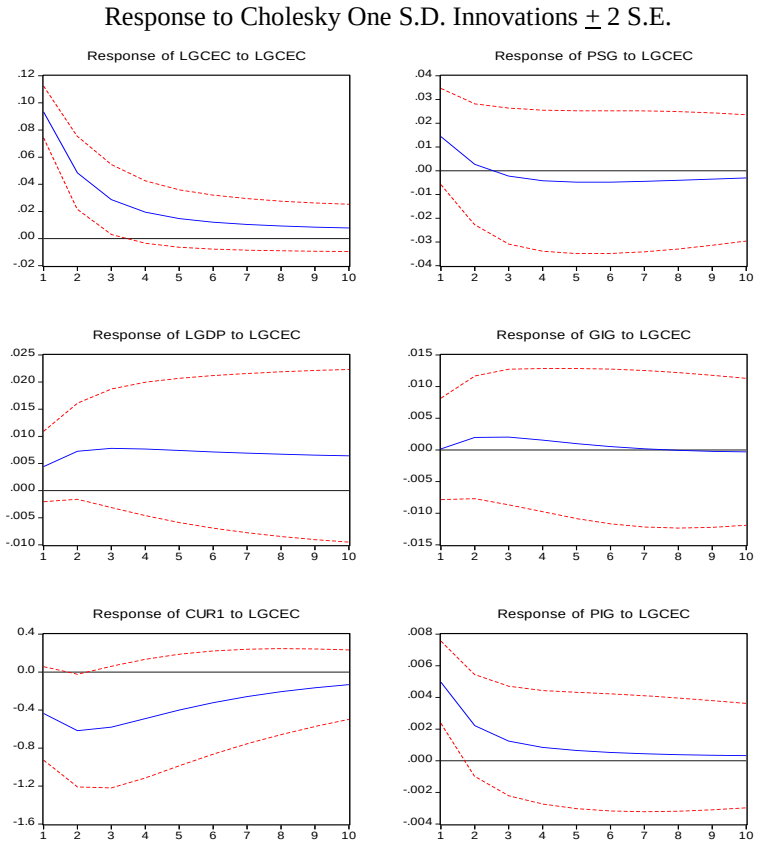
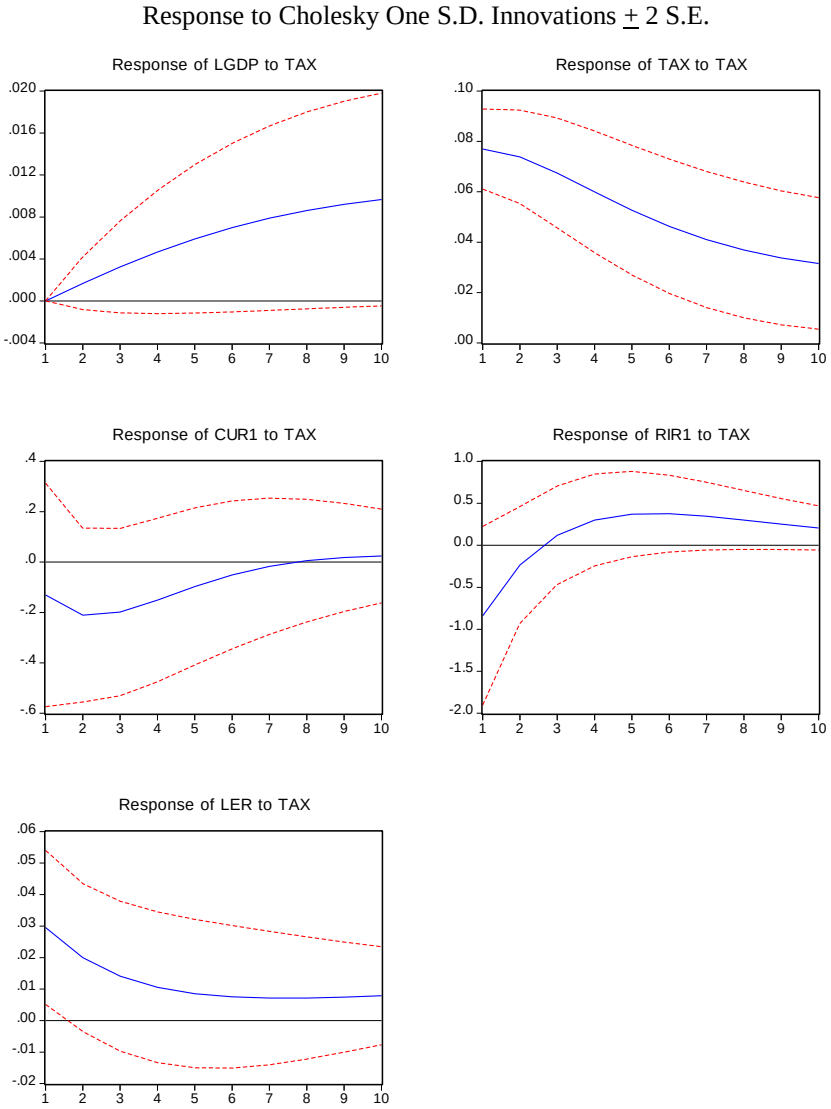


Fig. 3A. Effect of Government Spending shock on Current Account



Note: The SVAR model is estimated with one lag and a constant.
The ordering is {LGDP, GCEC, CUR, RIR, ER) and {LGDP, TT, CUR, RIR, ER) respectively.

Fig. 3B. Effect of Government Tax Shock on Current Account

The effect of government spending shock improves the current account and real GDP .The results are similar to one find by Kim and Roubini (2008). We also examine the component of the current account following this shock. Private saving decreases modestly while private investment fell significantly and persistently. This effect contributes to the improvement of the current account. Results of tax shock also show improvement in current account after initial deterioration which is consistent with Kim and Roubini (2008).

5. CONCLUSION

The study empirically investigates the effects of fiscal policy (government budget deficit shocks) on the current account and the other macroeconomic variable: real output, interest rate and exchange rate for Pakistan over the period 1960–2009. The analysis is performed through the structural Vector Autoregressive model (VAR) approach; the exogenous fiscal policy shocks are identified after controlling the business cycle effects on fiscal balances. In contrast to the predictions of the most theoretical models, the results suggest that an expansionary fiscal policy shock (or a government budget deficit shock) improves the current account and depreciates the exchange rate. The private saving rises initially then fall and the investment falls that contribute to the current account improvement while the exchange rate depreciation. The twin divergence of fiscal balances and current account balances is also explained by the prevalence of output shocks; output shocks, more than fiscal shocks, appear to drive the current account movements and its co-movements with the fiscal balance. The interesting, and somewhat different result of this study is that, while most economic theories suggest that a fiscal expansion should be associated with a worsening of the current account and an initial appreciation of the real exchange rate, the empirical results suggest the opposite: fiscal expansions and fiscal deficits are associated with an improvement of the current account and a exchange rate depreciation. The current account improvement occurs even after we control for the effects of the business cycle when an economic expansion improves the fiscal balance but worsens the current account. Therefore, even exogenous fiscal shocks seem to be associated with an improvement of the current account. This dynamics seems to be explained by a combination of factors such as, a fall (increase) in investment driven by crowding- out (crowding-in) caused by changes in real interest rates following fiscal shocks and movement in private savings can account for the paradoxical negative correlation between exogenous fiscal shocks and the current account which support the Recardian view [Nickel and Vansteenkiste (2008) and Kim and Roubini (2008)].

APPENDIX

Table A1

Variance Decomposition of BDG

Period	S.E.	LGDP	BDG	CUR1	RIR	LER
1	0.023228	0.330233	99.66977	0.000000	0.000000	0.000000
2	0.034440	0.877998	94.71721	0.011904	0.176277	4.216610
3	0.042401	7.963733	82.75321	4.191541	0.649404	4.442115
4	0.048514	11.97551	68.28784	13.26093	2.687550	3.788167

Table A2

Variance Decomposition of CUR1

Period	S.E.	LGDP	BDG	CUR1	RIR	LER
1	1.727798	5.524829	1.282259	93.19291	0.000000	0.000000
2	2.331007	12.69081	1.039011	82.85250	2.414011	1.003673
3	2.760526	16.34560	0.926345	76.00495	5.930536	0.792570
4	2.989704	16.14626	1.031587	74.22740	7.894974	0.699780

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Internal Migration Patterns in Pakistan— The Case for Fiscal Decentralisation

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I. INTRODUCTION

The cornerstone of fiscal federalism is to empower provinces through fiscal decentralisation, thereby reducing the friction between them. This is achieved if the distribution of resources between provinces is judicial and equitable, reducing the biases and divides amongst the provinces and leading to a stronger federation. In Pakistan, the National Finance Commission (NFC) awards are constituted to decide the share of the provinces in the federal revenues and to redistribute this share to the provinces. Over the years, there has been a gradual increase in federal shares. The federal government has also stretched itself into several matters that fall under the provincial purview (for instance roads, irrigation, culture and tourism and rural development) [Shah (1997)].

With the aimed devolution of power from the centre to the local government, it is imperative that these provincial governments have adequate finances to effectively carry out the subjects that fall under their domain. Moreover, there has been no serious shift in resource distribution amongst the provinces themselves, in spite of the disparities in economic and social development as well as varying political and security situations. This has, in turn, contributed in aggravating the differences between provinces over time, bringing into question the success of the NFC awards in fostering integration.

How does one measure integration then becomes a pertinent question. One indication of this can be the existing migration patterns within the country. What the patterns are and how they have evolved will reflect the degree of integration in the country. This is because migration patterns will reflect the perceptions of the masses regarding the possible destinations (from a choice of destinations both within and outside of their province of birth) and can hint at the success or failure, of the attempts at breaking provincial boundaries. Hence, increase in migration across provinces can indicate increased integration.

Historically, the distribution amongst provinces has solely been on the basis of population. The recent 7th NFC awards (2009) is a breakthrough for fiscal decentralisation in the country as the provincial shares have expanded to 56 percent from the 37 percent they received under the last award and for the first time population is not the sole criterion for resource sharing between the provinces. Also, the 18th amendment

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has brought many federal subjects into the provincial domain. For this reason it also becomes relevant to study the incentives that migrants in the country respond to when selecting the destination district. Exploring what these incentives have been historically can give us clues about the danger, or otherwise, of the phenomenon of Tiebout (1956) process unfolding in Pakistan.

We proceed by looking at existing literature in Section 2, detailing the data and methodology employed in Sections 3 and 4 respectively. The analysis is divided into two parts; Section 5 reports the empirical findings and the next section aims to study the recent migration flows and attempts to tie it with the relative development of districts in Pakistan. Section 7 concludes the paper.

II. LITERATURE REVIEW

Pakistan, as a federation, has had most of its revenues being collected by the centre and then redistributed vertically between the federal and provincial governments and horizontally between the provincial and local governments. There has been a clear trend towards fiscal and political decentralisation in a number of countries over the last few decades. A study done by Arghazi and Henderson (2002) shows that most developed countries and Latin American countries decentralised substantially in the 1980s and 1990s. On the other hand, countries in North Africa and Middle East were the most centralised. Interestingly, they found that the degree of population centralisation in the largest city of the country tends to be correlated with higher centralisation.

The idea that the degree of inter and intra provincial migration can be seen as an indicator of the success of decentralisation is not a new one. Much of the literature on horizontal competition migration stems from the seminal article by Tiebout (1956). Tiebout compared political jurisdictions to market places offering differing services. A migrant, as a rational utility maximising agent, weighs the benefit of these services against the cost when deciding on a destination district. As a result, the mobility of migrants and their 'voting with their feet' serve as a disciplinary force enforcing efficiency of local governments. Further, Oates (1972) believes that in customising local and provincial government public services to local needs, greater variation in tastes should lead to greater decentralisation for utility maximisation.

Traditional macro human capital theory, on the other hand, seeks to study aggregate moves and answer questions pertaining to socio-economic development and labour market concerns about the impact of migration on receiving and exporting regions in terms of jobs.[2] Within this perspective, the notion that rural-urban migration is effected by the differential in expected earnings between origin and destination put forward by Todaro (1969) and Harris-Todaro (1970), dominated theoretical research until recently. Alternative theories claim rural-urban migration flows consist, instead, of distinct streams with distinct objectives and that in fact, it is entirely plausible that it is economic growth and inequality that causes migration, and not vice versa.[3] Macro economic variables of interest include health and education, marriage,

[2]See Afser (2003), Banerjee and Kanbur (1981), Clark (1982), Dang, Goldstein and McNally (1997), Gazdar (2003), Oda (2007), Isserman, *et al*. (1985), McCormick and Wahba (2003), Mitchel and Pain (2003), Pingle (2007), Sato (2004), Stillwell and Congdon(1991), Vandsemb (2010).

[3]See in particular Bhattacharya (1998, 2000, 2002), Zhang and Song (2003), Deshingar (2006), Quisumbing and McNiven (2005).

infrastructure, informational and migrant networks at destination; and poverty, population density and landlessness at place of origin.[4]

The phenomenon of internal migration has not been comprehensively researched in Pakistan, primarily as a result of lack of data. The Population Census was last conducted in 1998, after a gap of 17 years. Oddly, it did not include information on the place of birth and so the direction of migration flows could only be measured with substantial errors. Therefore, Arif (2005) combines the information in the Census with the 2001 Pakistan Socio-Economic Survey and is able to show that roughly 40 percent of the migrants are rural to urban migrants and majority of the males (60 percent) cite economic reasons for migrating, whereas for females it is usually family issues like marriage. Khan and Shenaz (2000) do the same using the 1996-7 Labour Force Survey (LFS) and a micro-level, human capital model to study the decision to migrate. They find that migration is mostly in the urban-urban direction, followed by rural-urban.

More recently Memon (2005) compares the LFS, Census and Pakistan Household Integrated Survey for a district level study. Punjab was the main source of migration, with Sindh being the only province with a net inflow. Earlier Khatak (2004) uses the 1998 census to explore migration in KP. The majority of migrants in KP moved from other areas within the province were young and migrated for non-economic reasons (with family or spouse). Only 8.4 percent migrated for business purposes.[5] Contrast this with the case of India where internal migration stands at 30 percent as of 2001 [Lusome and Bhagat (2006)]; both industrialised states like Maharashtra and Gujrat and backward states like Orissa and Madhya Pradesh show high rates of migration [Mitra (2008)]. Apart from the above mentioned studies using the 1998 census and later surveys, a number of studies document internal migration during the 1970s and 1980s.[6]

III. DATA

The relevant data for the empirical part of the study is obtained from two different data sets: namely the Labour Force Survey (LFS) of Pakistan and the Population Census of 1998.

LFS has been conducted in Pakistan since 1963 every year by the Federal Bureau of Statistics. Detailed information on labour force characteristics is collected in the survey from a representative sample of households to produce gender disaggregated national and provincial level estimates with urban/rural breakdown. The total sample size is evenly distributed into four sub samples, each to be enumerated in a given quarter[7].For the purpose of our study, we use a pooled cross sectional data by merging LFS data for the years 2005-06, 2006-07 and 2007-08. This data is then used to estimate the in and out-migration rates for all districts of Pakistan.

[4]See for example Frey, *et al.* (1996), Haas (2010), Kanbur and Venables (2005), Mitra and Murayama (2008), Vandsemb (2010), Zhu and Luo (2010), Mehta (1991).

[5]In another study of migration patterns based on the 1998 census, Chaudhry (2004) was able to ascertain that Balochistan has a net outflow of migrants. In the case of Punjab, Naeem (2004) found that the number of people moving from Punjab exceeded the number of people moving to Punjab. Finally, using the 1998 census, Rukanuddin and Chaudhry (2004) observed that two-thirds of the internal migrants moved within Sindh.

[6]See Shah (1986), Irfan, Demery and Arif (1983), Barkley (1991), Farooq, Mateen and Cheema (2005).

[7]Labour force survey report foreword.

The nature of the study necessitates the use of district level macroeconomic variables to serve as proxies for the pull factors in the destination district for migrants. Such district wise information is only available in the Population Census. The 1998 Census was the last Population Census conducted in Pakistan. Given that it takes some time for news of changes in the facilities or employment levels in a particular district to spread, it is reasonable to expect a recognition lag between the actual situation as presented by these macroeconomic variables and what people perceive the situation to be. This helps to control the simultaneity bias that could result if the dependant and independent variables were of the same time period. In addition, some variables have also been employed from the Pakistan Social and Living Standards Measurement Survey (PSLM) 2004-05.These variables based on perceptions rather than the actual availability of social sector facilities within the destination districts; and so it was appropriate to use recent figures.

IV. METHODOLOGY

The sample employed in the study has been limited to the number of people who have migrated to urban areas in the last ten years for both economic and noneconomic reasons, irrespective of their previous district of residence. We only look at people who migrated within the last ten years since it is these individuals/families that have the potential to explain the motivation behind both the decision to move and where to move. It is not possible to trace the motivations for those who migrated over ten years ago as significant changes in their individual characteristics as well as the characteristics of their destination district would have arisen. There are two possible explanations for internal migration—it could be the pull of an urban centre indicating economic dynamism or migrants can be pushed out from a less developed district due to poor standards of living and economic opportunities. There are two broad approaches in literature to explain these push and pull factors; the macro and the micro approach. The macro approach either looks at the in or the out migration rates for a region and correspondingly uses the pull or the push factors of the region as explanatory variables. This approach looks at macro level variables such as provision of social amenities in a region, employment opportunities, level of development etc. The micro approach on the other hand explains the decision of an individual to migrate or not to migrate through individual level characteristics such as the level of education, years of experience, marital status etc. Quite obviously the macro level analysis is relevant for the objectives of this paper.

(i) Empirical

In order to study the factors that affect the in migration rates for districts of Pakistan, the dependent variable is constructed as the number of people migrating into a district as a proportion of the total district population.[8] This brings the total number of urban districts under consideration to 28. The independent variables aim to capture the

[8]It should be noted, that the total population here is the number of people from the district in the LFS sample.

pull factors of the district. As this study makes the receiving district the point of analysis, the independent variables are restricted to just the pull factors. Within these factors, the analysis is divided between the economic factors (unemployment and possibly degree of urbanisation) and non-economic factors such as education, utility provision and population characteristics.

Ideally, human capital models such as the one proposed by Todaro (1969) suggest that variables such as wage differentials between the origin and destination district or GDP at the district level ought to be considered as economic pull factors. However, neither the Population Census, nor the LFS provide this information at the district level. The only relevant economic variable that can be used for our analysis is the district unemployment rate. We expect districts with low unemployment rate to be attractive to migrants since it indicates better job opportunities and a larger economic base.

It is also expected that the level of urbanisation of a district will impact the number of migrants. Higher levels of urbanisation signal higher levels of development and therefore better economic opportunities for the migrants. For the purpose of the study this is approximated by the percentage of population of a district residing in urban areas.

The provision of public utilities like gas, electricity and piped water ought to be an essential consideration in the decision to migrate. Districts that are relatively deficient in these, otherwise very necessary provisions, should have low in-migration rates. The census enumerates the percentage of households in each district that have these facilities. There is high likelihood that the level of provision of these services will be highly correlated with each other and therefore for the empirical part of the study it might be appropriate to use only one of these.[9]

Next, we put in a control for the population density of a district in our analysis. It is not clear, a priori, what the relationship would be. On the one hand, areas with high density would discourage migrants to come to that area due to issues caused by overcrowding, and on the other hand areas with higher population density might also be perceived as having greater ability to absorb the influx of new migrants.

Factors pertaining to social sector services are controlled for by adding the education satisfaction variable, from PSLM 2004-05, that measures the percentage of people in a district who are satisfied by the educational facilities available in the districts. This serves to approximate what the perception of the migrants is regarding the social sector development of a district. If this is an important consideration for migrants, then a higher ratio is expected to attract a greater volume of migrants to the district. The district wise HDI is also employed to account for the actual level of social sector development in a district.

Finally, differences in characteristics of provinces not owing to the above explanatory variables are captured by employing dummies for Balochistan, KP and Sindh, with Punjab, the most prosperous province of the country, serving as the base case.

This allows us to specify the following model to determine the important characteristics of destination districts which result in varying levels of in migration as:

% of migrants in the districts

[9]The correlation between the availability of water and that of gas is 0.82, correlation between electricity and gas is 0.66.

$$= \alpha_1 + \beta_1 \text{Unemploymenr rate} + \beta_2 \text{urbanisation} + \beta_3 \text{Population density}$$

$$+ \beta_4 \text{Education Satisfaction} + \beta_5 \text{Utility availability} + \beta_6 \text{HDI}$$

$$+ \beta_7 \text{Balochistan} + \beta_8 \text{Sindh} + \beta_9 \text{KP}$$

The above model is estimated separately using OLS for rural-urban (RU) and urban-urban (UU) migrants.

(ii) Flows

We adopt a step by step approach for analysing the migration flows in Pakistan and building the case for fiscal decentralisation in light of them. The first step is to look at the province-wise migration to an urban area (either from a rural or an urban area). Next, we analyse the proportion of inter and intra provincial migration in Pakistan. High intra provincial figures would imply that people prefer to migrate in areas within their native province and are reluctant to move to other provinces. This in turn could be a signal of rigid provincial boundaries and lack of integration. Finally, we look at how this trend has evolved over time. It is especially important to see if there has been any improvement over time in this pattern which in turn would indicate some integration in the country and lessening of animosities between the provinces. We compare the inter with the intra provincial migration in the country from LFS 1994-5[10] and 2005-06.

V. EMPIRICAL RESULTS

The results (see Table 1) reveal that unemployment rate in the destination district has the largest impact as a choice variable for both RU and UU migrants. The level of employment in a district reveals the possible economic opportunities that are available. Therefore, a lower unemployment rate in a district would send a positive signal to the migrant. The coefficient turns out to be significant and negative; implying that on average a one percentage point difference in the unemployment rate of a district is likely to lead to a 0.16 percentage point difference in in-migration rate of rural migrants into that district and 0.24 percentage point difference for migrants coming from another urban area. This establishes the importance of the relative economic opportunities available in districts as an important explanation for the choice of an individual/family to migrate to a specific district.

In addition, the degree of urbanisation turns out to be a significant factor in attracting both types of migrants. This in turn can contribute to the even greater growth as compared to lesser urbanised districts as people converge towards these districts. Our result is consistent with the findings of Barkley (1991) who found the level of urbanisation to impact migration rates positively. His findings however suggest a much greater impact which may be attributable to a different in the time period under consideration. Urbanisation may have been a stronger pulling factor in the 1970s than today owing to the relatively lower development of rural areas then.

[10]LFS 1994-95 was the first time that the migration module was added to the LFS and is hence the oldest point of comparison we can use

Table 1

Results for OLS Estimation

	(1) % of Urban Migrants in the District	(2) % of Rural Migrants in the District
Unemployment Rate	–0.24	–0.16
	(0.050)*	(0.081)*
Education Satisfaction	–0.02	–0.03
	(0.494)	(0.156)
Urbanisation	0.0006	0.0003
	(0.003)**	(0.063)*
Population Density	–	1.63e-06
		(0.072)*
HDI	–0.06	–
	(0.284)	
Electricity Provision+	–.032	–
	(0.233)	
Balochistan	–0.03	–0.017
	(0.011)**	(0.019)**
Sindh	–0.02	–0.014
	(0.006)**	(0.05)*
KP	0.01	0.006
	(0.087)*	(0.96)
Constant	0.09	0.037
	(0.048)**	(0.026)**
Sample Size	28	28
Adjusted R-Squared	0.42	0.49

p-values in parentheses, *Significant at 10 percent, ** Significant at 5 percent.

+ Electricity provision was included for RU migration as well but due to inconsistent results was dropped out of estimation. A rural inhabitant would be assured of a better state of public utilities in all urban districts and therefore the variable does not have explanatory power in explaining the choice of urban district to migrate to.

Interestingly, rural migrants seem to be attracted more towards districts with higher levels of population densities.[11] While a more densely populated district would have a lower capacity to absorb more people, it might also have stronger network linkages for migrants which outweigh the overcrowding consideration. Past literature has emphasised the crucial role played by kinship and ethnic groups, extended families and informal social networks.[12]

Results reveal that districts in both Sindh and Balochistan have, on average, lower rural and urban migrants coming in as compared to Punjab. For the case of Balochistan, this is highly expected given the low level of development of the districts (Quetta itself has an HDI of 0.5397 which is lower than HDI of the lowest ranked district in Punjab),[13] thereby making them less attractive than districts in the rest of the country. The case of

[11]This variable does not appear in the final specification for UU migrants.

[12]See Haas (2010) and Gazdar (2003).

[13] Jamal and Khan (2006).

Sindh presents a conundrum given the presence of the largest urban centre of the country (Karachi) in the province. A possible explanation is the absence of large dynamic urban centres apart from the provincial capital in the province as compared to Punjab. Also, an overriding majority of rural migrants of Sindh move within the province but the numbers are small possibly due to the internal dynamics of rural Sindh. There are no significant differences between Punjab and KP as far as rural migrants are concerned, which is surprising as districts within KP are much less developed both economically and in terms of social sector facilities. However, urban migrants into districts of KP are greater in number than those migrating to Punjab. It could be just that the migration rate is high owing to the smaller populations of these districts, rather than a strictly greater absolute number of migrants.

Controlling for social sector development differences in the districts showed insignificant contribution of these factors in a migrant's decision. For rural migrants a possible explanation is that most migration out of rural areas in the country is motivated by economic considerations rather than a desire to seek improved access to these facilities. Another explanation is that the relative differences in the social sector development are not important to a rural inhabitant who would be improving upon his/her existing situation no matter which district s/he chooses to move to.

Clearly, migrants going towards urban districts of the country are motivated by the greater access to economic opportunities available rather than the degree of access to education and health facilities. For a deeper understanding of this, we would require a disaggregated analysis based on the income levels of migrants. The majority of low income migrants would give a greater consideration to improving their economic status rather than give weight to the availability of these facilities. On the other hand, higher income groups who give weight to these consideration would in most likelihood be unaffected by public sector provision of these facilities. Their primary concern would be the relative differences in quality of these provisions by the private sectors. Therefore, for both groups of migrants we find little or no evidence for the differences across districts in quality or quantity of these services serving as a motivating factor for migration.

From the above analysis of RU and UU migrants, it can be inferred that a migrant in Pakistan is rational and bases his choice on the economic opportunities available to him/her in the destination district. Migrants are mainly driven by the level of development and in turn the better employment opportunities in the district they are moving to. Punjab being the only province with a number of dynamic urban centres receives a greater number of migrants than the other provinces, once again reflecting that the migrants base their decision on the opportunities available.

VI. FLOWS

The net internal migration stands at 2.6 percent of the sampled population with equal contribution from RU and UU flows. Of these people, about 23 percent move across the province. A common trend observed in both flows is the pull of the major cities of Pakistan (provincial and federal capitals). More than half of all migrants going to urban centres move to these cities highlighting the importance of these centres thereby raising concerns of overcrowding.

Taking a look at the proportion of people who have migrated out of each province (Table 2), the highest figure of Sindh can be attributed to the presence of the largest metropolitan centre in the county where half the migrants are going and the relatively poorer rural area than Punjab. For the case of UU migrants, in KP, the low level of development of the urban centres as compared to Peshawar seem to be pushing people out since half of them are migrating to the city. On the other hand, the high figure for Punjab might be attributable to the presence of a spectrum of middle level urban centres in the province.

Table 2

Province Wise Migration

Province	Rural-Urban	Urban-Urban	Total
Punjab	1.35%	1.43%	2.79%
Sindh	1.86%	0.54%	2.40%
Khyber Pakhtunkhwa	1.11%	2.39%	3.50%
Balochistan	0.50%	0.49%	0.94%

(i) Rural-Urban Flows

Figure 1 presents the proportion of people from each province (normalised to 100) who moved across and within the same province. Of all RU migrants out of Punjab and Sindh, an overriding majority (more than 75 percent) move within the province pointing to the relatively lower mobility of rural migrants. While this percentage is lower for KP and Balochistan, still, more than half remain within the province. This is surprising given the dramatic differences in level of development between the two western and the two eastern provinces and their close proximity to each other. Thus, it is not just physical distance that is important but rather the distances between people that seem to be playing a part in their decision on where to move.

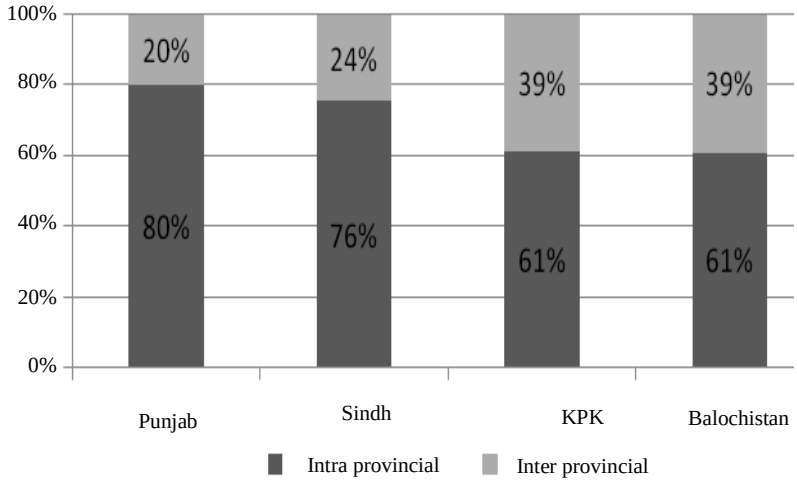

Fig. 1. Rural Urban: Percentage of People Moving Within and Across Provinces

(ii) Urban-Urban Flows

The considerations and the pull factors for UU migrants vary considerably from that of RU migrants. Traditional human capital theories suggest that the educated in the urban areas have a greater likelihood of securing employment elsewhere and therefore their expected increase from migration is high. This in turn results in their greater mobility as documented by past studies specifically in terms of distance becoming less important. The differences in the standard of living do not remain as obvious and the characteristics of the migrants are also different. However, the case of Pakistan presents a contradiction where more UU migrants seem to choose to stay within their province as compared to the RU migrants (see Figure 2). The numbers have gone up to close to 70 percent for even the less developed provinces of Balochistan and KP and have further increased for the other two more prosperous provinces.

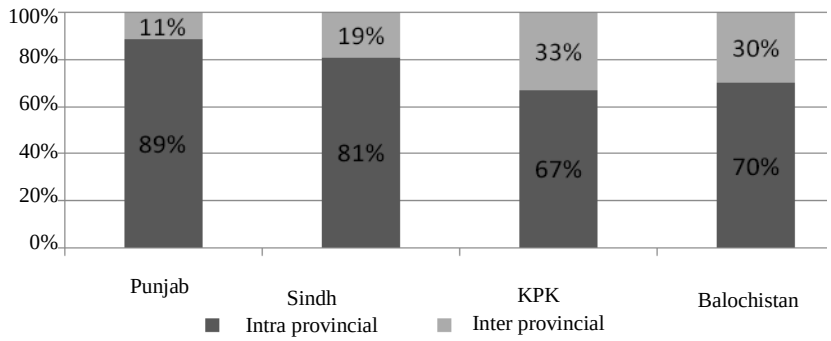

Fig. 2. Urban Urban: Percentage of People Moving Within and Across Provinces

The distance that each type of migrant is moving will give us further insights into the actual situation and how it relates with what the pattern is theorised to be. At a very basic level, looking at people migrating out of districts that border two provinces, 70 percent of the migrants in 13[14] out of 26 of these districts are ignoring the closer urban centres across the provincial boundary and instead travelling a greater distance to one within the province.

Furthermore, movement to provinces is largely uni-polar (for e.g. 62 percent of all urban migrants to Sindh move to Karachi district, as is the case of Peshawar from within the KP province). This points to the need of enhancing the economic opportunities and absorption abilities of other districts so that the polarisation pattern that exists can be reversed.

The findings above establish the rigidity of provincial boundaries in Pakistan for both types of migrants. A high proportion of the people are choosing a destination within their province of origin. Figure 3 shows the province wise aggregate (both UU and RU) inter and intra provincial migration from LFS 94-95 and LFS 05-06. The results show that barring Sindh, intra provincial migration figures have not improved for any other province in the last 2 decades. Hence, overall there has been no discernable improvement in degree of integration in the country as reflected by the proportion of inter provincial migration.

[14] For 8 out of these 13 districts, the figure stands at 80 percent

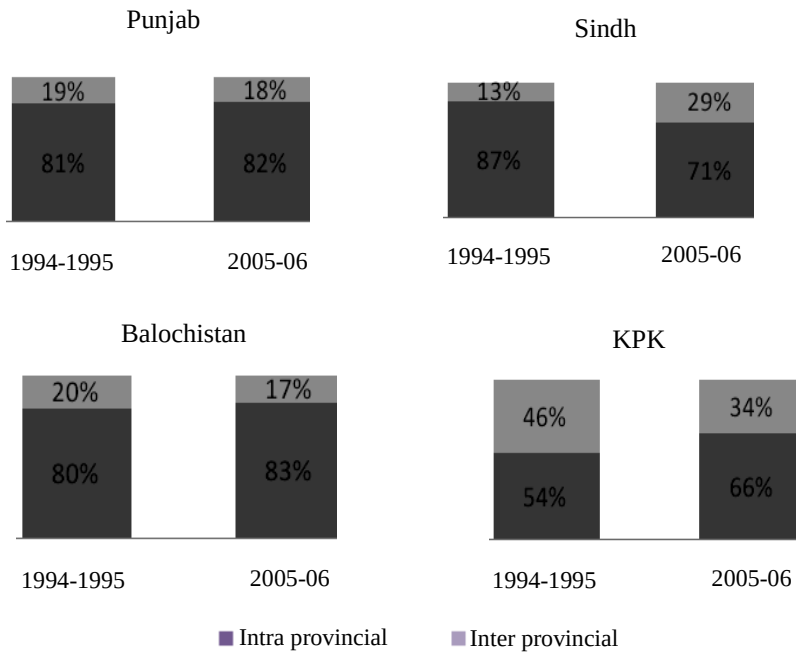

Fig. 3. Province-wise Historical Pattern of Inter and Intra Provincial Migration

VII. CONCLUSION

The migrants in the country are found to be rational agents, responding more to economic incentives than the degree of social sector development of the destination districts. Further, provincial boundaries appear to be rigid; highlighting the failure of policy in increasing integration in the country over time. Therefore, the move towards decentralisation through the 7th NFC awards is an important step, but only if it is followed consistently as a policy in the future.

What also becomes equally important is how federal funds are distributed within the provinces with the migration patterns suggesting heavy concentration towards the provincial capitals. With Punjab being the largest recipient of the federal funds and the metropolitan cities receiving a disproportionately high share within the provincial funds, we expect the influx of migrants and their resulting problems to be exacerbated. There is a need to enhance the economic opportunities and absorption abilities of other districts to prevent further polarisation, and perhaps, reverse it. A deeper understanding of district wise movement can give us further insight on how these processes are working.

In conclusion, after 60 years as a federation we appear to have been unable to reduce the resentment amongst the provinces and foster integration. Though this was not one of the objectives of this paper, one of the avenues that other studies can explore are the implications of said lack of integration and what policy makers need to do to address this issue when setting provincial budgets.

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Budget Balance through Revenue or Spending Adjustment: Evidence from Pakistan

NADEEM IQBAL and WASIM SHAHID MALIK

1. INTRODUCTION

Government cannot roll over the debt forever (ponzi game is not allowed). In the long run, inter-temporal budget constraint has to be satisfied, which is possible either through government spending adjustment or increasing government revenues. So current budget deficit calls for adjustment, in the future, in spending or revenues. There are four hypotheses, in the literature, in this regard: the tax-and-spending hypothesis, the spending-and-tax hypothesis, bi-directional causality between government revenues and government expenditures, and independence of taxes and expenditures hypothesis. The last hypothesis, however, have negative implications, in the long run, in terms of debt sustainability and inflation.

The empirical literature give mixed result on the intertemporal relationship between government expenditures and taxes due to various time periods analysed, lag length specifications, and methodology used in the study. Manage and Marlow (1986), Blackley (1986), and Ram (1988) support 'the tax and spending' hypothesis. Anderson, Wallace, and Warner (1986), Von Furstenberg, Green, and Jeong (1986) and Jones and Joulfaian (1991) support 'the spending-and-tax' hypothesis. Miller and Russek (1989) find bi-directional causality, whereas Baghestani and McNown (1994) find that government expenditures and taxes are not affected by budget deficit.

Most of the studies available, in this regard, have focused on the experiences of developed economies and the issue has not been investigated for the case of developing countries. So this study aims at testing the four hypotheses, stated above, in the context of inter-temporal budget constraint for the case of Pakistan using data over the period 1961 to 2008. For this, reaction of fiscal policy instruments to lagged fiscal deficit has been estimated. More specifically, it is investigated how government adjusts taxes, government expenditures and/or total debt in response to fiscal deficit.

While estimating government's fiscal policy response to budget deficit, econometric issues related to non-stationarity of taxes, government expenditures and debt are important. Most of the times, data on government expenditures, taxes and debt are non-stationary. On the other hand, intertemporal budget constraint requires stationarity of

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primary deficit—transversality condition must hold. This suggests estimating model as Vector Error Correction Model (VECM)—the methodology we have used in this study, as we impose the intertemporal budget constraint. The main result we obtain is that in case of Pakistan budget is balanced either through raising debt or monetising deficit. Neither revenues nor government expenditures are adjusted in response to increased fiscal deficit. We also find that the behaviour of government expenditures and that of taxes are independent of each other.

Rest of the study proceeds as follows. Section 2 briefly describes the literature regarding historical behaviour of intertemporal budget constraint and the empirical issues in the study of intertemporal budget constraint. Section 3 discuses the theoretical model and econometric methodology used in the study. The fourth section is regarding the data and variables construction. In fifth section results are discussed. Section 6 concludes the study.

2. LITERATURE REVIEW

2.1. Intertemporal Budget Constraint

The Intertemporal budget balance put constraint on the behaviour of government. It implies that government with high debt must run high future surplus in term of present value and it can be generated through adjustments in taxes, government expenditure or seigniorage [Buiter (2002)]. Researcher and economist have done alot of work to solve the deficit problem and suggest different ways to resolve the long run primary deficit problem. Best approach to solve the problem depends on the intertemporal relationship between government expenditure and tax. Huge research has been done to study empirically this relationship. But interestingly most of the papers have focused on the experiences of US economy and a few examine budget deficit situation in OECD country. On the other hand there have been almost negligible studies to focus on the situation of developing countries.

2.2. Tax and Spending Debate

There are four main hypotheses on the relationship between government expenditure and revenue i.e. Tax-and-spend hypothesis, Spend-tax hypothesis, Bi-directional causality between government revenue and government expenditure and Taxes and expenditure are independent from each other.

The tax-and-spend hypothesis suggests that changes in government revenue are followed by changes in government expenditure. Friedman (1978), Blackely (1986) Ram (1988) and Buchanan and Wagner (1977, 1978) show that increase in government revenue will cause to increase in government expenditure and therefore this approach will not play any role in reducing budget deficit.

The spend-tax hypothesis suggests that changes in government expenditure are followed by changes in government revenue. According to Peacock and Wiseman (1979) argued that temporary increase in government expenditure due to emergency purposes lead to increase in permanent increase in government taxes or other type of revenue. Barro (1974, 1978) argue that the result given by Buchanan-Wagner between government expenditure and tax due to fiscal illusion does not exist. Barro uses Ricardian equivalence

proposition. According to Barro if government fulfills his expenditure through borrowing, then this will result an increase in tax liabilities in future. Anderson, et al. (1986) used granger causality test and argued that change in government expenditure lead to change in total revenue. Jones and Joulfaian (1991) and Ross and Payne (1996) showed the same result by applying Engle-Granger error correction method and Johansen-Juselius multivariate co integration ARCH model respectively.

The third hypothesis states that there is bi-directional causality between government revenue and government expenditure. Musgrave (1966), and Meltzer and Richard (1981) suggests the fiscal synchronisation hypothesis. They compare the marginal benefit and marginal costs of the services provided by the government, to make appropriate decision regarding the level of government expenditure and government revenue. Manage and Marlow (1986) applied Granger causality test and found that there is bi-directional causality between taxes and expenditure.

The fourth hypothesis states that taxes and expenditure are independent from each other. Baghestani and McNown (1994) apply Johansen-Juselius multivariate cointegration and found that there is no long run cointegration between taxes and expenditure.

Tehran and Walsh (1988) used Johansen-Juselius multivariate co-integration method and provide evidence which reject the tax smoothing hypothesis and unable to reject the hypothesis of Intertemporal budget balance. Bohn (1991) use Error correction model and concluded that about 65–70 percent of budget deficit due to high government spending and about 50–65 percent budget deficit due decrease in taxes have been eliminated by step wise decreased in government spending and the remainder is eliminated by step wise increased in tax revenue.

The bulk of empirical literature on the tax-spend debate has focused on the US budget deficit situation with a few exceptional papers. Provopoulos and Zambaras (1991) studied Greece budgetary process by applying granger causality test and analysed that government expenditure have lag effect on taxes. Owoye (1995) applied Engle-Granger error correction method and found that the historical behaviour of budget deficit for Canada, France, Germany, UK and US support the fiscal synchronisation hypothesis. And in case of Italy and Japan there is ui-directional causality between tax and government expenditure. Payne (1996) used the Johansen-Juselius multivariate cointegration procedure and error correction model. He found that budget imbalance situation is corrected by changes in government expenditure. Darrat (1998) used bivariate and multivariate model and suggested that optimal policy to solve the budget deficit problem is to raise taxes. He found negatively uni-directional causality which stems from taxes to government expenditure for Turkey.

2.3. Empirical Literature

The empirical literature discussed above give us mixed result on the intertemporal relationship between government expenditure and taxes. Because these studies used a variety of different procedures which give us conflicting and contradictory result. For example Lutkepohl (1982, 1993) discussed that bivariate Granger causality models have a problem of omission-of-variable bias. In bivariate setting if a variable is not found to cause another variable, so inferences on the bases of such model will not be correct in the

context of a larger economics system which included other important variable. Bivariate granger causality model is used by Manage and Marlow (1986), Anderson, *et al*. (1986) and Ram (1988) etc. Lutkepohl (1982, p.367) writes, "This conclusion is a consequence of the well-known problem that a low dimensional sub process contains little information about the structure of a higher dimensional system." In order to solve this problem von Furstenberg, Green, and Jeaon (1986) and Anderson, Wallace and Warner (1986) etc. have incorporated other important variables and used multivariate Granger causality models.

Another source of mixed result is that such standard Granger causality tests ignore other sources of causality stemming from long-run relationships among the variables. This problem is taken into account by Miller and Russek (1990) and Owoye (1995) by using error correction model. But unfortunately there models are of bivariate nature i.e. they just check the relationship between government expenditure and taxes. Miller (1991) and Darrat (1994) etc. has shown that problem of omission-of-variables bias is not only related with bivariate standard causality tests, but it also effect the result derives from the bivariate error correction model. Another objection to empirical analysis is that simple regression analysis or unrestricted VAR is used. Demopoulos, Katsembris, and Miller (1987) used simple regression analysis or unrestricted VAR to study granger causality which ignore information about the long-run behaviour of taxes, debt and seigniorage that is implied by intertemporal budget balance. Intertemporal budget balance implies a cointegration relationship between deficit and debt and this link restrict the behaviour of expenditures, taxes and seigniorage. This fact implies that multivariate vector error correction model should be used to the study the behaviour of expenditures, taxes and seigniorage. Bohn (1991) used multivariate vector error correction model. But he does not treat seigniorage separately. Bohn (1991) is used methodology in this paper and but seigniorage is treated both separately and together with total revenue.

3. THEORY AND ECONOMETRIC METHODOLOGY

3.1. Theoretical Framework

As intertemporal budget constraint has to be satisfied, a government cannot sustain long term primary deficit. The intertemporal budget constraint consists of tax revenues, seigniorage revenues, government expenditures, interest payments, and government debt. Budget equation is given as:

$$B_{t+1} = G_t - T_t + (1+r)\, B_t + \varepsilon_{t+1} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Where, T_t denotes tax revenues including seigniorage revenues and G_t denote government expenditures net of interest payments.[1] Interest payments are excluded from the variable G because we are interested in primary deficit to study intertemporal budget constraint.[2] B_t is used for government debt and r is the interest rate on total debt. Finally, ε_{t+1} is the error term. The error term shows that tax revenues, government expenditures and government debt do satisfy exact linear relationship in given time period. Barro (1979) and Tehran and Walsh (1988) assume that expected real return on government debt is

[1]But later on to check the robustness of results, seigniorage will be taken separately.

[2]For reference, see McCallum (1984).

constant, in which case, error term is uncorrelated with right hand side variables. If, on the other hand, r is not constant then error term may have correlation because of the mistake in approximating the real return. Equation (1) can also be written as

$$G_t + (1+r)\, B_t = T_t + B_{t+1} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Where error term is assumed to be zero. In this case equation suggests that the budget constraint is satisfied each period. Dividing Equation (2) by aggregate output in the economy we get the following equation.

$$g_t + (1+r^*) b_{t-1} = t_t + b_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

Where g_t, t_t, and b_t are, respectively, the ratio of government expenditures (excluding interest payments), tax revenues including seigniorage revenues, and the ratio of total government debt to aggregate measure of output. r^*_t is the real interest rate net of economic growth rate. As budget is balanced each period, we can write the intertemporal budget constraint, by performing the forward substitution, for period $\tau = t$ to $\tau = T$, as.

$$b_{t-1} = \sum_{\tau=t+1}^{\infty} \left[\frac{1}{1+r^*)^{\tau-1}} S_{\tau-1} \right] + \lim_{\tau\to\infty} \left[\frac{1}{1+r^*)^{\tau-1}} b_{\tau-1} \right] \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

Where s_t is primary budget surplus and is given as, $s_t = t_t - g_t$. The stability of fiscal policy depends on the second term of Equation (4). According to the literature the path of second term is very important for the condition of sustainable fiscal policy. In projecting future policy variable, it is important to recognise that government budget constraint restrict the joint movement of fiscal variables. If transversality condition holds then the change in fiscal variables is subject to intertemporal budget constraint. Transversality condition and then resultant intertemporal budget equation can be written as,

$$\lim_{\tau\to\infty} \left[\frac{1}{(1+r^*)^{\tau-1}} b_{\tau-1} \right] = 0 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

$$b_{t-1} = \sum_{\tau=t+1}^{\infty} \left[\frac{1}{(1+r^*)^{\tau-1}} S_{\tau-1} \right] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

Equation (6) will be satisfied if the growth rate of government debt is less than the interest rate—'*No Ponzi Game Condition*'.

Empirical literature proposes different methods to check the sustainability of above conditions. To check whether the transversality condition holds, testing for stationarity of primary budget surplus is suggested in the literature. Hamilton and Flavin (1986) derive the testable hypothesis as,

$$b_{t-1} = \sum_{\tau=t+1}^{\infty} \left[\frac{1}{(1+r^*)^{\tau-1}} S_{\tau-1} \right] + \left[\frac{1}{1+r^*)^{-1}} A_0 \right] \quad \ldots \quad \ldots \quad \ldots \quad (7)$$

Intertemporal budget constraint will be violated if A_0 is greater than zero. The market value of government debt will be equal to the sum of the discounted future budget surpluses, if

and only if A_o in the above equation is equal to zero i.e. stationarity of primary budget deficit is sufficient condition for sustainable fiscal policy. It means if primary deficit is stationary at first difference, then intertemporal budget balance holds only if primary deficit and government debt are cointegrated of order 1. Wilcox (1989) suggests that the discounted value of government loan must go to zero in infinite future when interest rate is not constant for a sustainable fiscal policy. According to Quintos (1995) and Hakkio and Rush (1991), transversality condition holds if Δt_τ and Δg_τ are stationary.

There is an alternative method to test whether or not intertemporal budget equation holds. If primary budget deficit and government debt are non-stationary, intertemporal budget constraint requires studying the cointegration relationship between primary budget deficit and public debt. Macdonald (1992) subtracted $(1/r)\ s_{t-1}$ from both sides of Equation (6) and get the following Equation (8)

$$b_{t-1} = -\frac{1}{r*} S_{t-1} = \sum_{\tau=t+1}^{\infty} \left[\frac{1}{(1+r*)^{\tau-1}} (S_{\tau-1} - S_{\tau-2}) \right] \quad \ldots \quad \ldots \quad \ldots \quad (8)$$

Where, $s_{\tau-1} - s_{\tau-2} = \Delta s_{\tau-1.}$ So equation implies that testing of stationarity of $\Delta s_{\tau-1}$ is similar to the testing of linear combination of $r^* b_{t-1} - s_{t-1.}$ By using the Engle-Granger (1987) definition, on the basis of Equation (8), the cointegration implies that the linear combination $s_{t-} r^* b_{t} = \varepsilon_t$ is stationary at levels because of the existence of $r*$ parameter. It means that primary budget deficit and public debt are cointegrated. So the equilibrium relation is given as:

$$S_t - r* b_t = \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (9)$$

Where the cointegrating vector $\beta = (1, -r*)$.

Similarly according to the Granger representation theorem, the co-integration between public debt and budget deficit can be discussed by using the error-correction representation as given below.

$$\Delta S_t = \alpha + \lambda(S_{t-1} - r* b_{t-1}) + \delta_s \Delta S_{t-1} + \delta_b \Delta b_{t-1} + u_t \quad \ldots \quad \ldots \quad \ldots \quad (10)$$

In the cointegration model $s_{t-1} - r^* b_{t-1}$ is the equilibrium error. Equation (10) tells about the short run behaviour of budget deficit and public debt. In statistical sense, $s_{t-1} - r^* b_{t-1}$ is the speed of adjustment and show that budget deficit and public debt are cointegrated. Error correction model show that in short run public debt and budget deficit may diverge, but in the long run they will converge.

To study the behaviour of intertemporal budget constraint non-stationary behaviour of time series data is a critical and important. Augmented Dickey-Fuller test is used, to test whether variables are stationary or not. Schwartz criterion is used for lag length selection in unit root test equation. ADF equation is given as,

$$\Delta X_t = \alpha_0 + (1-\beta) X_{t-1} + \alpha_1 t + \sum_{i=1}^{p} \beta_i \Delta X_{t-1} + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad (11)$$

Where X_t denote variable (government expenditures, total tax revenues, total debt, seigniorage etc), "Δ" is used for first difference, "ε_t" is error term or covariance stationarity random term and "p" show the number of lag.

So if variables are non-stationary at level but stationary at first difference, then long run relationship can be established by testing for the presence of cointegration. For this, we apply Johnson Cointegration approach instead of the Engle-Granger approach (EG). EG approach is easy to understand and to implement. However recent literature [e.g. Davidson and MacKinnon (1993); Noriega-Muro (1993); Kramers, Ericson, and Dolado (1992); and Inder (1993)] has shown that there are important shortcomings of Engle-Granger methodology.

The system of equations in Johansen methodology can be written as

$$\begin{pmatrix} \Delta T_t \\ \Delta G_t \\ \Delta W_t \end{pmatrix} = \Gamma_1 \begin{pmatrix} \Delta T_{t-1} \\ \Delta G_{t-1} \\ \Delta W_{t-1} \end{pmatrix} + \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{23} \end{pmatrix} \begin{pmatrix} \beta_{11} & \beta_{21} & \beta_{31} \\ \beta_{12} & \beta_{22} & \beta_{32} \end{pmatrix} \begin{pmatrix} T_{t-1} \\ G_{t-1} \\ W_{t-1} \end{pmatrix} + \varepsilon_t \quad \ldots \quad (12)$$

The objective of this study is to analyse how the values of fiscal variables react to lagged changes in deficit. In order to tell about the future fiscal policy variable it is important to note that the intertemporal budget constraint satisfy the standard-transversality condition as discussed in theoretical framework. For intertemporal budget constraint to be satisfied, it is necessary that government debt is stationary at first difference, which imposes restriction on the cointegration relationship of variables in vector X_t. The linear combination of budget deficit is given as

$$DEF_t = Gt - Tt + r.\, B_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (13)$$

Combining Equations (12) and (13) we get the following error correction model:

$$A\,(L)\,\Delta Xt = -\alpha.\beta' X_{t-1} + u_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (14)$$

Where $DEF_{t-1} = \beta' X_{t-1}$. As $\beta' Xt-1$ is the error correction term i.e. primary budget deficit and it contains (n–1) vectors, Equation (14) becomes:

$$A\,(L)\,\Delta Xt = -\alpha.DEF_{t-1} + u_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (15)$$

We use this equation as error correction model for estimation.

4. DATA DESCRIPTION AND VARIABLES' CONSTRUCTION

In this study the period of analysis is 1961 to 2008. Three main variables used in the study are government outlays net of interest payments; government receipts or total revenues including seigniorage revenues; and total debt. All variables are deflated by GDP. Following Bohn (1991), we have subtracted interest payments from government expenditures, but we our variable of government revenues include seigniorage revenues. Arby (2006) has constructed series for seigniorage but the duration of the data is from 1973 to 2005, whereas requirement is from 1961 to 2007. So series of seigniorage is calculated for M2 and reserve money (M_O) as: Seigniorage from M2 = (M2 of 2000-M2 of 1999)/GDP deflator of 2000 and Similarly for M_0 = (M_O of 2000- M_0 of 1999)/ GDP deflator of 2000.

Primary budget deficit is calculated as given in the following equation, [see McCallum (1984)].

$$DEF_t = G_t - T_t$$

Where DEF_t is the primary budget deficit, G_t is the government expenditures without interest payments and T is the total taxes.

Data on primary budget deficit, domestic debt, foreign debt, interest payments by the government, GDP deflator, government expenditures, total taxes, M2, reserve money (Mo) and GNP are obtained from various issues of Economic Survey of Pakistan, World Development Indicators 2008 and from International Financial Statistics 2009.

5. RESULTS AND DISCUSSION

To estimate the government response to budget deficit it is important to first check the stationarity of taxes, government expenditures, and debt and budget deficit. Augmented Dickey-Fuller test is used to test the stationarity of data. The lag length is selected on the basis of Schwarz information criterion. Results in Table 1 show that each variable is non-stationary at level, because the null hypothesis of unit root cannot be rejected but all variable are stationary at first difference i.e. variables are I(1).

Table 1

Results of Augmented Dickey Fuller Test

	Level		First Difference		
Variable	P-Value	Lag Length	P-Value	Lag Length	Result
TR_Y	0.2227	0	0.0000**	0	I(1)
TRWSM2_Y	0.2207	0	0.0000**	0	I(1)
TRWSRM_Y	0.2216	0	0.0000**	0	I(1)
SM2_Y	0.2047	2	0.0000**	2	I(1)
SRM_Y	0.3727	1	0.0000**	0	I(1)
TD_Y	0.6197	1	0.0122**	0	I(1)
DD_Y	0.1964	1	0.0228**	0	I(1)
GENDS_Y	0.3968	0	0.0000**	1	I(1)
DEF_Y	0.4207	0	0.0000**	0	I(1)

The next important step is to test the presence of cointegration because if the variables are cointegrated then they have long run equilibrium relationship. Johansen cointegration test is used to find the number of cointegration vectors. In the first step we test cointegration among total revenues including seigniorage revenues, government expenditures, and total debt and results of this base case are given in Table 2. Then we have done the same in a number of different settings: taking domestic debt instead of total debt, taking seigniorage revenues only from reserve money, taking government revenues and seigniorage revenues as two different variables, (results of these other specifications are given in Appendix).

Table 2

Results of Cointegration Test

No of CE(s)	Trace Statistics	5% Critical Value	Max. Eigen Statistics	5% Critical Value
None *	45.62207	35.19275	30.79129	22.29962
At most 1	14.83078	20.26184	11.14421	15.89210
At most 2	3.686569	9.164546	3.686569	9.164546

Series: TRWSM2_Y, GENDS_Y &TD_Y.

Results in Table 2 and in appendix show that both Trace Statistics and Max Eigenvalue Statistics indicate one cointegrating vector at 5 percent level of significance. It means that there exist long run relationship between total revenues, government expenditures and debt.

Table 3 displays results of error correction model. Again we have estimated error correction model with different specifications; results of base case are given in the text while that of other specifications are given in appendix. While estimating error correction model we have taken lagged value of primary deficit as exogenous variable. The objective is to estimate the response of fiscal policy instruments, government expenditures, government revenues and total debt, to the lagged value of primary deficit. Our results show that lagged deficit has insignificant effect on government revenues and expenditures, but the response of debt to deficit is positive and significant. Thus, in Pakistan, budget is balanced by increasing liabilities; it is neither financed by increasing total revenues, nor by adjusting government expenditures. So a deficit does not generate long run stabilising effect on total revenues and government expenditures.

Moreover, results in Table 3 make it clear that total revenues have inertia factor. Total revenues are not followed by changes in government spending, but revenues have significant and negative effect on debt. So it is clear that 'spend-and-tax' hypothesis does not hold in case of Pakistan. Furthermore, it is found that changes in government expenditures are not followed by changes in total debt. It is also found that lagged values of total debt have significant and positive effect on total revenues and government expenditures. These results show that total revenues and government expenditures do not respond to budget deficit directly. In Pakistan, most of the times, budget deficit is financed through raising debt. Moreover, neither 'spend-and-tax hypothesis' nor 'tax-and-spend hypothesis' is valid.

Table 3

Results of Error Correction Model with Total Debt

	ΔTRWSM2_Y	ΔGENDS_Y	ΔTD_Y
ΔTRWSM2_Y(–1)	–0.334687	–4.89E–05	–3.022350
	(–1.80413)	(–0.00011)	(–3.59955)
ΔTRWSM2_Y(–2)	–0.441870	–0.079860	–0.933256
	(–2.33925)	(–0.18245)	(–1.09158)
ΔTRWSM2_Y(–3)	–0.210913	–0.2365588	–1.394202
	(–1.15175)	(–0.55755)	(–1.68211)
ΔGENDS_Y(–1)	0.129961	0.046788	0.227757
	(1.66911)	(0.25932)	(0.64628)
ΔGENDS_Y(–2)	–0.010080	–0.326772	0.250576
	(–0.14001)	(–1.95882)	(0.76900)
ΔGENDS_Y(–3)	0.048400	0.059699	0.351861
	(0.65122)	(0.34664)	(1.04598)
ΔTD_Y(–1)	–0.030557	–0.124572	0.439044
	(–0.92023)	(–1.61900)	(2.92127)
ΔTD_Y(–2)	0.066052	0.175228	0.058368
	(1.77371)	(2.03066)	(0.34629)
ΔTD_Y(–3)	0.003483	–0.020537	0.347252
	(0.09041)	(–0.23002)	(1.99115)
DEFC_Y(–1)	0.010818	–0.036498	0.196987
	(0.60648)	(–0.88303)	(2.44000)

To check the robustness of the above results we estimate vector error correction model with different specifications and results are given in appendix. The results do not change when domestic debt rather than total debt is used as one of the variable. Again debt is the only variable that responds to lagged values of deficit; adjustment takes place neither in revenues nor in expenditures. Same results hold when other specifications are estimated. As pointed out by Walsh (2003), Bohn (1991) does not differentiate between the effects of deficit on Seniorage revenues and on other revenues.

In this study we have done this to look at separate effects of budget deficit on two types of revenues. We get very interesting results in this case. Results in Table 4 show that deficit has positive and significant effect on revenues from seigniorage and debt. It means in case of Pakistan budget deficit is financed through printing of money i.e. monetisation of deficit and through borrowing by selling bonds. However, as shown in the appendix, the effect is found to be low when total debt instead of domestic debt is used as one of the endogenous variables.

Table 4

Results of Error Correction Model (Total Revenues, Seigniorage, Government Expenditures and Domestic Debt)

Error Correction	Δ(TRC_Y)	Δ(GENDS_Y)	Δ(SM_Y)	Δ(DD_Y)
CointEq1	–0.268416	–0.065588	0.009777	2.160811
	[–1.32824]	[–0.15365]	[3.39549]	[3.65816]
D(TRC_Y(–1))	–0.357451	–0.281878	–0.001322	0.668592
	[–1.96928]	[–0.73519]	–[0.51097]	[–1.26018]
D(TRC_Y(–2))	–0.364949	0.230862	–0.004982	–0.170757
	[–2.09195]	[0.62649]	[–2.00426]	[–0.33487]
D(TRC_Y(–3))	–0.262922	–0.368893	–0.008034	0.588983
	[–1.61568]	[–1.07319]	[–3.46511]	[1.23826]
D(GENDS_Y(–1))	0.162287	0.228386	0.001028	–0.531629
	[1.79708]	[1.19729]	[0.79894]	[–2.01406]
D(GENDS_Y(–2))	0.043592	–0.392602	–3.07E–05	0.105448
	[0.56788]	[–2.42131]	[–0.02811]	[0.46997]
D(GENDS_Y(–3))	0.071298	0.152993	0.001259	–0.418773
	[0.90683	[0.92122]	[1.12385]	[–1.82224]
D(SM_Y(–1))	–18.73020	–31.11492	–0.166965	240.0038
	[–0.91703]	[–0.72120]	[–0.57372]	[4.02011]
D(SM_Y(–2))	–2.879966	1.026279	–0.041367	178.9205
	[–0.17371]	[0.029311]	[–0.17512]	[3.69218]
D(SM_Y(–3))	3.778299	–32.63954	0.066509	120.9209
	[0.31993]	[–1.30843]	[0.39525]	[3.50301]
D(DD_Y(–1))	–0.034021	–0.201559	–0.001157	0.427441
	[–0.67873]	[–1.90369]	[–1.62056]	[2.91746]
D(DD_Y(–2))	0.053981	0.017371	0.00842	–0.130671
	[0.99377]	[0.13856]	[2.17844]	[–0.75324]
D(DD_Y(–3))	0.093013	0.89854	–0.000718	0.254302
	[1.67401]	[1.61764]	[–0.90656]	[1.56583]
DEFC_Y(–1)	–0.032258	–0.051575	0.001857	0.342614
	[–0.84597]	[–0.64032]	[3.41754]	[3.07398]

6. CONCLUDING REMARKS

This study investigates the historical behaviour of intertemporal budget constraint for Pakistan from 1961 to 2008. We test four hypotheses, i.e. First Tax-and-spend hypothesis, second spend-tax hypothesis, third that there is bi-directional causality between government revenues and government expenditures, and fourth taxes and expenditures are independent of each other.

Our analysis shows that in case of Pakistan budget deficit and debt have close relationship. Budget deficit is financed through borrowing; it has effect neither on government expenditures nor on taxes. So a deficit does not generate long run stabilising effect on total revenues and government expenditures. Government expenditures have insignificant effect on future taxes and similarly lag value of taxes has no effect on future taxes. So neither 'spend-and-tax hypothesis' and nor 'tax-and-spend hypothesis' is satisfied. It means in case of Pakistan we found that taxes and spending decision are taken independently and there is no long run cointegration between taxes and expenditures.

Next we estimate error correction model by taking total revenues and seigniorage separately. In both cases we estimate the model with total debt first and then with domestic debt. In this case we get another interesting result that in case of Pakistan budget imbalances are reduced either through borrowing or through monetisation of debt. Results show that budget deficit has no impact on the behaviour of government expenditures and taxes. Moreover change in taxes is not followed by change in government expenditures and vice versa. It means there is no cointegration between taxes and spending. So historical behaviour of Pakistan's intertemporal budget constraint show that taxes and spending decisions are independent of each other.

APPENDIX

List of Variables

Symbol	Variable
TRWSM2_Y	Total revenues, including seigniorage revenues calculated from M2, as ratio of GDP
TRWSRM_Y	Total revenues, including seigniorage revenues calculated from reserve money, as ratio of GDP
GENDS_Y	Government expenditures, net of debt servicing, as ratio of GDP
DD_Y	Domestic debt as ratio of GDP
TD_Y	Total debt as ratio of GDP
TRC_Y	Total government revenues, net of seigniorage revenues, as ratio of GDP
SM_Y	Seigniorage revenues calculated from M2, as ratio of GDP
SRM_Y	Seigniorage revenues calculated from reserve money, as ratio of GDP
DEF_Y	primary deficit as ratio of GDP
FD_Y	Foreign debt, as ratio of GDP
DGE_Y	Developmental government expenditure, as ratio of GDP
NGENDS_Y	Non-developmental governmental expenditure, as ratio of GDP

Table 5

Results of Cointegration Test

No of CE(s)	Trace Statistics	5% Critical Value	Max. Eigen Statistics	5% Critical Value
None *	29.96288	29.79707	24.13832	21.13162
At most 1	5.824565	15.49471	5.794939	14.26460
At most 2	0.029626	3.841466	0.029626	3.841466
Series: TRWSM2_Y GENDS_Y & DD_Y				
No of CE(s)	Trace Statistics	5% Critical Value	Max. Eigen Statistics	5% Critical Value
None *	23.95788	24.27596	21.03970	17.79730
At most 1	2.918172	12.32090	2.174876	11.22480
At most 2	0.743296	4.129906	0.743296	4.129906
Series: TRWSRM_Y , GENDS_Y & TD_Y				
No of CE(s)	Trace Statistics	5% Critical Value	Max. Eigen Statistics	5% Critical Value
None *	41.22606	35.19275	29.77811	22.29962
At most 1	11.44795	20.26184	6.934601	15.89210
At most 2	4.513351	9.164546	4.513351	9.164546
Series: TRWSRM_Y, GENDS_Y &DD_Y				
No of CE(s)	Trace Statistic	Prob	Max statistic	Eigen Prob
None*	63.4917	0.0058	39.06797	0.0016
At most 1	24.42620	0.4356	14.39919	0.4261
At most 2	10.02701	0.6372	6.756837	0.6991
At most 3	3.20172	0.5314	3.270172	0.5314
Series: TRC_Y GENDS_Y SM_Y TD_Y				
No of CE(s)	Trace Statistic	Prob	Max statistic	Eigen Prob
None*	67.45065	0.0021	48.83018	0.0000
At most 1	18.62046	0.8079	9.166689	.8939
At most 2	9.453774	0.6932	6.128683	0.7734
At most 3	3.3325091	0.5218	3.325091	0.5218
Series: TRC_Y GENDS_Y SM_Y DD_Y				
No of CE(s)	Trace Statistic	Prob	Max statistic	Eigen Prob
None*	65.99949	0.0030	33.13326	0.0122
At most 1	32.86624	0.0873	20.94666	0.764
At most 2	11.91958	0.4560	7.693533	0.5846
At most 3	4.226049	0.3795	4.226049	0.3795
Series: TRC_Y, GENDS_Y, SRMY_Y, DD_Y				
No of CE(s)	Trace Statistic	Prob	Max statistic	Eigen Prob
None*	66.08399	0.0030	44.67940	0.0002
At most 1	21.40459	0.6354	10.75020	0.7724
At most 2	10.65439	0.5756	6.205074	0.7646
At most 3	4.449313	0.3493	4.449313	0.3493
Series: TRC_Y, GENDS_Y, SRMY_Y, DD_Y				

Table 6

Results of Error Correction Model (Total Revenue with Seigniorage of Reserve Money, Government Expenditure Net of Debt Services and Domestic Debt

	ΔTRWSRM2_Y	ΔGENDS_Y	ΔDD_Y
ΔTRWSRM2_Y(–1)	–0.351953	0.397701	[–2.17444]
	[–1.36714]	[0.76790]	–1.533776
ΔTRWSRM2_Y(–2)	–0.312734	0.165544	0.692800
	[–1.43555]	[0.37773]	[–1.16068]
ΔTRWSRM_Y(–3)	–0.250465	–0.150345	–0.377855
	[–1.31089]	[–0.39114]	[–0.72177]
ΔTRWSRM_Y(–4)	–0.130263	0.235840	–0.519420
	[–0.72341]	[0.65103]	[–1.05278]
ΔGENTS_Y(–1)	0.141539	–0.018285	–0.235251
	[1.56530]	[–0.10052]	[–0.94954]
ΔGENTS_Y(–2)	0.024942	–0.288259	0.007453
	[0.28952]	[–1.66322]	[0.03157]
ΔGENTS_Y(–3)	0.073663	0.171380	–0.063969
	[0.92077]	[1.06483]	[–0.29183]
ΔGENTS_Y(–4)	0.013582	–0.057411	0.10134
	[0.16952]	[–0.35618]	[0.46068]
ΔDD_Y(–1)	–0.027164	–0.203596	0.336447
	[–0.47853]	[–1.78279]	[2.16314]
ΔDD_Y(–2)	0.043725	–0.105754	–0.018009
	[0.70583]	[–0.84857]	[–0.10610]
ΔDD_Y(–3)	0.071057	0.106105	0.258094
	[1.16965]	[0.86818]	[1.55055]
ΔDD_Y(–4)	0.008712	0.183695	0.172818
	[0.11175]	[1.17125]	[0.80905]
DEFC_Y(–1)	–0.054831	–0.364970	0.913589
	[–0.52814]	[–1.04744]	[3.21169]

Table 7

Results of Error Correction Model (Total Revenue, Seigniorage of M2, Government Expenditure Net of Debt Services and Total Debt)

Error Correction	D(TRC_Y)	D(GENDS_Y)	D(SM_Y)	D(TD_Y)
D(TRC_Y(–1))	–0.441228	0.572400	0.002062	–4.308401
	[–53831]	[1.01463]	[0.46085]	[–4.08018]
D(TRC_Y(–2))	–0.654187	0.455214	–0.007918	–2.618640
	[–2.19021]	[0.77486]	[–1.69967]	[–2.38145]
D(TRC_Y(–3))	0.260954	0.226348	–0.010466	–2.269430
	[–1.01644]	[0.44825]	[–2.61396]	[–2.40114]
D(TRC_Y(–4))	–0.335501	0.004227	–0.004890	–1.445685
	[–1.23151]	[0.00789]	[–1.15084]	[–1.44145]
D(GENDS_Y(–1))	0.045697	0.113882	0.000588	–0.492162
	[0.42789]	[0.54215]	[0.35298]	[–1.25179]
D(GENDS_Y(–2))	0.007814	–0.343560	0.001900	0.432062
	[0.07705]	[–1.72238]	[1.20143]	[1.15726]
D(GENDS_Y(–3))	0.002540	0.013603	0.001974	–0.141124
	[0.02654]	[0.07226]	[1.32256]	[–0.40055]
D(GENDS_Y(–4))	0.002196	0.009959	0.002124	0.342801
	[0.02415]	[0.05567]	[1.49754]	[1.02378]
D(SM_Y(–1))	20.74560	–37.48728	–1.046000	177.3903
	[1.11032]	[–1.02007]	[–3.58951]	[2.57889]
D(SM_Y(–2))	9.105571	–36.09849	–0.826406	151.0856
	[0.43675]	[–0.88031]	[–2.54156]	[1.96847]
D(SM_Y(–3))	11.39129	–81.60653	–0.350687	148.8383
	[0.60383]	[–2.19932]	[–1.19191]	[2.14306]
D(SM_Y(–4))	–2.298891	–52.98199	–0.188221	7.839990
	[–0.16058]	[–1.88159]	[–0.84299]	[0.14875]
D(TD_Y(–1))	–0.047742	–0.064347	–0.000733	0.336876
	[–1.13165]	[–0.77545]	[–1.11469]	[2.16900]
D(TD_Y(–2))	0.084097	0.087831	0.000403	0.079787
	[1.84895]	[0.98179]	[0.56852]	[0.47650]
D(TD_Y(–3))	–0.017609	–0.066158	4.09E–05	0.359114
	[–0.39235]	[–0.74945]	[0.05843]	[2.17346]
D(TD_Y(–4))	0.038754	–0.010551	0.000580	0.339852
	[0.76582]	[–0.10601]	[0.73441]	[1.82422]
DEFC_Y(–1)	0.068231	–0.078262	0.000940	0.879550
	[1.20758]	[–0.70422]	[1.06689]	[4.22842]

Table 8

Results of Error Correction Model (Total Revenue, Seigniorage of Reserve Money, Government Expenditure Net of Debt Services and Total Debt)

Error Correction	D(TRC_Y)	D(GENDS_Y)	D(SRM_Y)	D(DD_Y)
CointEq1	0.195962	0.027059	0.008214	2.957854
	[0.89518]	[0.05692]	[2.01372]	[3.74523]
D(TRC_Y(–1))	–0.422595	0.305812	–0.011192	–4.150749
	[–1.64009]	[0.54651]	[–2.33112]	[–4.46511]
D(TRC_Y(–2))	–0.614986	–0.214473	–0.009306	2.630864
	[–1.988386]	[–0.31931]	[–1.61477]	[–2.35773]
D(TRC_Y(–3))	0.264299	0.068661	–0.002089	–1.987083
	[–1.04447]	[0.12494]	[–0.44301]	[–2.17660]
D(TRC_Y(–4))	–0.188469	0.088174	–0.003703	0.214152
	[–0.81580]	[0.17575]	[–0.86030]	[0.25694]
D(GENDS_Y(–1))	0122390	0.127546	0.002014	0.024655
	[1.32352]	[0.63512]	[1.16887]	[0.06491]
D(GENDS_Y(–2))	0.006359	–0.292331	–0.002374	0.692252
	[0.06528]	[–1.38193]	[–1.30786]	[1.96986]
D(GENDS_Y(–3))	0.060435	0.037289	0.001317	0.066830
	[0.65936]	[0.18733]	[0.80274]	[0.20210]
D(GENDS_Y(–4))	–0.038555	–0.109401	0.000275	0.109570
	[–0.44312]	[–0.57897]	[0.23103]	[0.34905]
D(SRM_Y(–1))	10.9112	–20.7534	0.04158	86.84958
	[0.66382]	[–0.58140]	[0.04623]	[1.46456]
D(SRM_Y(–2))	11.9209	9.956785	0.135938	59.45282
	[0.86499]	[0.35434]	[0.56384]	[1.27361]
D(SRM_Y(–3))	10.32392	18.57157	0.114252	130.7490
	[0.82222]	[0.68108]	[0.48834]	[2.88632]
D(SRM_Y(–4))	13.47381	–2.175212	0.021475	73.80717
	[1.23680]	[–0.09194]	[0.10579]	[1.87788]
D(TD_Y(–1))	–0.038882	–0.095054	–0.001119	0.279150
	[–0.82535]	[–0.92911]	[–1.27483]	[1.64245]
D(TD_Y(–2))	0.074207	0.193640	0.00046	0.076192
	[1.56564]	[1.88124]	[0.50524]	[0.44557]
D(TD_Y(–3))	–0.002368	–0.096740	–0.000982	0.274681
	[–0.04989]	[–0.93830]	[–1.110311]	[1.60371]
D(TD_Y(–4))	–0.010136	0.018558	0.003138	–0.019589
	[–0.23174]	[0.19558]	[3.85004]	[–0.12414]
DEFC_Y(–1)	0.027306	–0.031992	0.001440	0.471968
	[0.70528]	[–0.38050]	[1.99667]	[3.37895]

Table 9

Results of Error Correction Model (Total Revenue, Seigniorage of Reserve Money, Government Expenditure Net of Debt Services and Domestic Debt)

Error Correction	D(TRC_Y)	D(GENDS_Y)	D(SRM_Y)	D(DD_Y)
CointEq1	–0.246975	0.121981	0.010145	2.017235
	[–1.26858]	[0.26496]	[2.22951]	[–0.999907]
D(TRC_Y(–1))	–0.257703	–0.314573	–0.009056	–0.999907
	[–1.35036]	[–0.69706]	[–2.03019]	[–1.67422]
D(TRC_Y(–2))	–0.249801	–0.167031	–0.003513	–0.324387
	[–1.35387]	[–0.38282]	[–0.81448]	[–0.56179]
D(TRC_Y(–3))	–0.141128	–0.264345	0.001930	–0.001648
	[–0.85041]	[–0.67360]	[0.49750]	[–0.00317]
D(GENDS_Y(–1)	0.157722	0.013310	0.002658	–0.123073
	[2.15099]	[0.07676]	[1.55070]	[–0.53633]
D(TRC_Y(–2))	0.007541	–0.237097	–0.001398	0.189006
	[0.09972]	[–1.32587]	[–0.79087]	[0.79856]
D(TRC_Y(–3))	0.065224	0.022351	0.000326	–0.204458
	[0.86903]	[0.12594]	[0.18587]	[–0.87048]
D(SRM_Y(–1))	–16.76806	–30.66098	–0.172070	81.59525
	[–1.77107]	[–1.36949]	[–777756]	[2.75386]
D(SRM_Y(–2))	–4.072221	–4.512423	0.302883	61.65837
	[–0.38728]	[–0.18148]	[1.23240]	[1.87376]
D(SRM_Y(–3))	–4.383064	8.774189	0.142874	66.79731
	[–0.51127]	[0.43281]	[0.71303]	[2.48976]
D(DD_Y(–1))	–0.031944	–0.247028	5.14E–06	0.331604
	[–0.58063]	[–1.89880]	[0.00400]	[1.92601]
D(DD_Y(–2))	0.082719	0.033071	0.001318	–0.128964
	[1.30845]	[0.22122]	[0.89181]	[–0.65184]
D(DD_Y(–3))	0.075697	0.214737	–0.002013	0.197850
	[1.30661]	[1.56745]	[–1.48623]	[1.09126]
DEFC_Y(–1)	–0.045506	–0.018452	0.002469	0.460230
	[–0.92660]	[–0.15889]	[2.15083]	[2.99446]

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Expenditure-Growth Nexus: Does the Source of Finance Matter? Empirical Evidence from Selected South Asian Countries

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1. INTRODUCTION

Government can generate revenues to finance its expenditure in three major ways i.e., taxes, bonds and seigniorage.[1] Interestingly, public expenditure financed through different sources affect growth differently. Which source of finance is less distortionary? is a question that has attracted great attention over the years. However, no consensus is available on the relative importance of the financing source.

The prominent work on this issue relates to Miller and Russek (1997) who provide a detailed discussion over the relative importance of tax financed and debt financed increases in government expenditure in terms of economic growth and report that the results vary considerably as the source of finance differs.[2] Similarly, Bose, Holman and Neanidis (2005) compare the effect of tax financed and seigniorage financed increases in public expenditure on economic growth.[3] Likewise, Palivos and Yip (1995) analyse the effects of tax financed and money financed government consumption expenditure on economic growth and social welfare within a framework of endogenous growth model. Latter, in another study Espinosa-Vega and Yip (1999) study the effects of money financed and tax financed increases in government consumption expenditure on inflation and economic growth.

These studies have a common limitation that they do not examine the effects of taxes, bonds and seigniorage individually. The results may vary when all the three sources are taken into account simultaneously. This study attempts to consider major sources of public finance simultaneously to measure precise effect of public

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[1]Revenues generated from printing of money are called seigniorage.

[2]Miller and Russek (1997) report that in developing countries tax financed increases in public expenditure lead to higher growth while debt financed increases retard economic growth. For developed countries, debt financed increases in public expenditure does not affect growth while tax financed increases lead to lower growth.

[3]Bose, Holman and Neanidis (2005) suggest that in high income countries tax financed government expenditure retard economic growth than if it were financed through seigniorage while for low income countries increases in government expenditure financed with seigniorage retard growth more as compared to if it were financed through taxes.

expenditure on growth. The knowledge regarding the relative importance of different sources of finance is critically important for the decision makers especially in developing countries where high fiscal deficits persist. The rest of the study is organised as follows; Section 2 describes data and variables. Section 3 presents model and econometric methodology. Section 4 comprises results. Section 5 concludes the study with some policy implications.

2. DATA AND VARIABLES

The analysis employs panel data for four South Asian countries viz., Pakistan, India, Sri Lanka and Nepal[4] over the period 1975–2008. Variables are categorised into two groups, fiscal and non fiscal variables. Fiscal variables comprise public expenditure, public revenues and government surplus/deficit. Trade openness, population growth and investment[5] are the non fiscal/conditional variables. All variables are measured as a share of GDP except growth in per capita GDP, the dependent variable, and population growth. Variables come from three sources i.e., World Development Indicator (WDI), Government Finance Statistics (GFS) and International Finance Statistics (IFS).

3. THE MODEL AND ECONOMETRIC METHODOLOGY

We start our model by defining the growth rate of per capita GDP as under.[6]

$$git = lny_{it} - lny_{it-1} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Where g_{it} is growth in per capita GDP in country i at time t. y is the Gross Domestic Product per capita, ln is the natural logarithm operator. Let X_{it} be the vector of non fiscal/conditional variables that generally appear in growth regressions and W_{jt} be the budget constraint,[7] the model can be written as under;

$$g_{it} = \beta + \sum_{i=1}^{n} \theta_i X_{it} + \sum_{j=1}^{m} \gamma_j W_{jt} + u_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Where u_{it} is the error term. The error term u_{it} captures, as usual, the impact of omitted variables. The critical assumption about error term in classical regression model is that it is independent and identically distributed. In pooled cross-section time series analysis these omitted variables can be further categories into three groups. Hence, the error term can be written as;

$$u_{it} = \alpha C_i + \delta T_t + \pi_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

Where C_i denotes the variation in cross country variables such as climate and geography[8] and α measures the effect of these variables. T_t shows the time variant but country

[4]Unavailability of data forced us to exclude other South Asian countries from the sample.

[5]Gross fixed capital formation as a share of GDP is used as a proxy for investment.

[6]We borrow some work from Miller and Russek (1997), Helms (1985), Bose, Holman and Neanidis (2005).

[7]Budget constraint is discussed shortly.

[8]These variables are time invariant.

invariant variables such as world economic conditions, technological changes, external effects such as war and δ captures the influence of these factors. π is the measure of both country and time variant variables. Now by substituting Equation (3) into Equation (2) the model takes the following form:

$$g_{it} = \beta + \sum_{i=1}^{n} \theta_i X_{it} + \sum_{j=1}^{m} \gamma_j W_{jt} + \alpha C_i + \delta T_t + \pi_{it} \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

The estimation of above equation by ordinary least square method will yield misleading results if the country specific and time specific effects are ignored.[9] To avoid this bias we apply Fixed Effect Model (FEM).[10] An alternative to FEM is Random Effect Model (REM) but our choice is biased towards FEM.[11]

3.1. Government Budget Constraint

Government budget constraint can be written as an identity:

$$EXPN_{jt} = NTR_{jt} + TR_{jt} + D_{jt} + S_{jt} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

Where *EXPN* is the total government expenditure including interest payments on debt. *NTR* is non tax revenue, *TR* is tax revenue , *S* is the seigniorage used to finance budget deficit and *D* is the debt financing or rest of the budget financing.[12] The left hand side of the above identity shows total expenditure while right hand side is the total revenues from different sources. Inclusion of all the above components of budget constraint into Equation (4) will give rise to the problem of perfect collinearity as budget constraint is an identity. So, to avoid this (at least) one of the components of budget constraint must be omitted from the regression equation. The excluded element becomes an implicit source of financing of expenditure as it can change freely. For example if we omit D_{it} and include all other elements in Equation (4) then coefficient attached with public expenditure captures the impact of debt financed increases in public spending on economic growth as the other sources of finance do not change. Likewise, other financing source i.e., tax and debt can be excluded in turn.[13] This taxonomy has been adopted from Ahmed and Miller (2000), Miller and Russek (1997) and Bose, Holman and Neanidis (2005).

4. RESULTS

As mentioned earlier, Fixed Effect Model (FEM) is used to estimate different specifications. Table 1 shows the estimation output.

[9]See Hsiao (1986).

[10]FEM is also called Least Square Dummy Variable (LSDV).

[11]"If T (the number of time series) is large and N (the cross sectional unit) is small, there is likely to be little difference in the values of the parameters estimated by FEM and REM. Hence, the choice here is based on computational convenience. On this score FEM is preferable" [Gujrati (1995)].

[12]New issues of interest bearing debt make a major part of rest of budget financing [Bose, Holman, and Neanidis (2005)].

[13]Non tax revenue is not a choice variable. So we exclude debt, tax and seigniorage in turn to see the impact of public expenditure on economic growth when financed through these sources.

Table 1

Results with Aggregated Public Expenditure Using Fixed Effect Model (FEM)
Per Capita GDP Growth is the Dependent Variable

	Tax Finance	Debt Finance	Money Finance[14]
Total Expenditure	–0.329*	–0.397*	–0.510***
	[–2.68]	[–3.33]	[–1.67]
Openness	0.101**	0.103**	0.102**
	[2.43]	[2.47]	[2.44]
Population	0.509	0.504	0.537
	[1.45]	[1.48]	[1.58]
Investment	0.149***	0.148***	0.150***
	[1.75]	[1.76]	[1.77]
R-square	0.486	0.485	0.486
F-test	2.09	2.07	2.10

*, **, ***mean significantly different from zero (two tailed test) at the 1 percent, 5 percent and 10 percent level respectively. T-statistics are in parenthesis.

We start our discussion with the result for conditional variables. Openness variable conveys generally a consistent story over time. It remains highly significant with a positive sign in all the specifications. This means that trade openness has exerted positive effect on the economic growth of this region. This finding is consistent with the existing empirical literature.[15]

Population growth, contrary to general perception, shows a positive impact on growth in this region. It reveals that labour force has contributed to the output of these economies over time. The reason for this result may be the highly dependence of these economies on agriculture sector that absorbs a large number of people and contributes significantly to output of the country. This finding is similar to that of Hakro (2009) who states that labour force is positively and significantly associated with economic performance of the developing South Asian nations. This suggests that government should spend on education, training and skills as these facilities will enhance the productivity of the workers. However, this finding is contrary to Siddiqui and Malik (2001) who report that population growth is negatively associated with growth in South Asia.

The results reported in Table 1 also show that public investment has triggered growth in South Asia which highlights the role of infrastructure in stimulating economic growth in developing countries. This can be explained in terms of either underinvestment on the part of private sector or the greater marginal productivity of public sector resources. It suggests that scarce government expenditure should be directed to increase new human capital along with the maintenance of the existing stock of human capital. The findings are in conformity with the findings of Knight, Loayza and Villanueva

[14]We use Fischer (1982) procedure to estimate magnitude of seigniorage in our base line regression.

[15]A significantly positive impact of openness variable on investment share of GDP has been reported by Levine and Renelt (1992). Ahmed and Miller (2000) also find a positive significant effect of a country's openness on its investment. Bose, Holman and Neanidis (2005) point out the positive effect of trade variable on economic growth both for developed and developing countries.

(1993), Ahmed and Miller (2000), Ramirez and Nazmi (2003) and Amanja and Morrissey (2005) who report that public investment is positively associated with economic growth in developing countries.

Now the results of fiscal variables, in which we are interested more, are discussed. Table 1 clearly brings out that the method of financing has a crucial role in determining the effects of government spending on economic growth. It is found that tax financed increases in public spending are negatively associated with per capita GDP growth. The findings of Barro (1990) support our results. He states that tax financed public spending, mainly income tax on investment reduce profits on private investment, and thus affect growth negatively. However, Miller and Russek (1997) report results that are contrary to our findings. They conclude that tax financed expenditure are pro growth for the group of developing countries.

It is also found that debt financed increases in government expenditure also affect growth negatively. Similar conclusion is reached by Miller and Russek (1997) who point out that debt financed increases in public spending are negatively associated with growth in developing countries. Likewise, Siddiqui and Malik (2001) conclude that debt accumulation has affected growth negatively in Pakistan, India and Sri Lanka. They also report that all the debt indicators show significant negative relationship with growth.

As well as money financed expenditure are concerned, the findings are not different from the previous two findings. It is concluded that money financed expenditure produces a significant decrease in economic growth for selected South Asian countries. The similar results are also reported by Bose, Holman and Neanidis (2005). They conclude that seigniorage financed public expenditure retards growth in developing countries.

The results derived from the analysis highlight the relative importance of different sources of financing public expenditure in context of economic growth. It is inferred that though expenditure exert negative effect financed through any source on growth yet they can be ranked according to their relative effects. Tax financed expenditure hurts growth least followed by debt financed and seigniorage financed expenditure. This ranking is based on the magnitude of the coefficients attached with public expenditure in different specifications. The negative effect of seigniorage is largest as compare to debt financed and tax financed public expenditure i.e., ($|-0.51| > |-0.40| > |-0.33|$).

The findings that public expenditure is negatively correlated with economic performance in South Asia mentions the inefficiency of the public sector in this region. The reason of this negative effect of public expenditure on growth may be the higher share of non development expenditure in total expenditure. Furthermore, politicisation of public resources can also explain this negative relationship between public expenditure and economic growth. It is also possible that the government size may have risen above the threshold level. The larger negative effect of monetisation of public deficit reveals that the high inflation has caused much to these economies. Tax financed expenditure hurt least which shows that there is room to bridge fiscal deficit by enhancing the efficiency of tax system and increase in tax revenue. It can be achieved by broadening the tax base that is too narrow to generate government revenues to finance its expenditure.

4.1. Analysis with Alternative Measures of Seigniorage

Now we re-do the previous exercise with two alternate measures of seigniorage[16] to check the robustness of base line results.[17] The results are reported in Table 2. It is clear from Table 2 that the results do not change with alternate measures of seigniorage regarding public expenditure. The conditional variables have also the same sign and level of significance.

Table 2

Results with Alternative Seigniorage Measures Using Fixed Effect Model (FEM)
Per Capita GDP Growth is the Dependent Variable

	Fischer (1982)	Walsh (1978)	De Haan, *et al.* (1983)
Public Expenditure	–0.510***	–1.157***	–1.271***
	[-1.67]	[-1.70]	[-1.81]
Openness	0.102**	0.099**	0.099**
	[2.44]	[2.40]	[2.41]
Population	0.537	0.439	0.331
	[1.58]	[1.41]	[1.31]
Investment	0.150***	0.142***	0.139***
	[1.77]	[1.69]	[1.68]
F-test	2.09	2.15	2.16

**, ***mean significantly different from zero (two tailed test) at 5 percent and 10 percent level respectively. T-statistics are in parenthesis.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The study follows the procedure adopted by Miller and Russek (1997), Bose, *et al*. (2005) and Ahmed and Miller (2000) to find the precise effects of fiscal variables on economic growth. Contrary to previous empirical studies, this study considers three sources of financing i.e., tax, debt and seigniorage simultaneously to analyse their individual impact on growth. It is found that source of financing of public expenditure has a crucial role in determining its impact on economic growth. Debt financed public expenditure retard economic growth. Similarly expenditure financed through seigniorage has also significant negative effect on economic growth. Likewise tax financed public expenditure is negatively associated with economic growth. Although all sources of public expenditure hamper growth yet seigniorage financed expenditure has a larger negative effect on growth than debt financed and tax financed expenditure.

Several policy implications emerge from the analysis. Firstly, reduction in deficit is positively associated with economic growth as public expenditure financed through any source retard growth in the sample. Decrease in expenditure holding the revenue constant may be effective to enhance growth. Secondly, the role of governments in these countries has not been efficient and needs to be redefined. Thirdly, tax finance is the

[16]Walsh (1998) and De Haan, Zelhorst, and Roukens (1993).

[17]There are some other measures of seigniorage available in empirical literature and the analysis with only one such measure does not seem sufficient. The detail description of these seigniorage measures is available in the appendix.

relatively less costly option to finance public expenditure in low income countries as it hurts growth least as compare to its counter parts debt and seigniorage financed public expenditure. However, in general fiscal discipline and reorganisation of scarce resources can boost economic growth in this region.

Appendices

Table A-1

Measures of Seigniorage

Variables	Description
Monetary Base (or high-powered money)	Reserve money (line 14 in IFS)
Seigniorage1:	Ratio of the change in high powered money to nominal GDP (Fischer 1982)
Seigniorage 2:	Ratio of high-powered money to nominal GDP in current period minus ration of high-powered money to nominal GDP in last period plus the product of the ratio Of high-powered money to nominal GDP in last period times the growth rate of nominal GDP In current period to one plus the growth rate of GDP in current period (Walsh 1998).
Seigniorage 3:	Ratio of the product of the inflation rate times high-powered money to the product of one plus the inflation rate times nominal GDP [de Haan, *et al.* (1993), Walsh (1998)].

Reproduced from Bose, Holman and Neanidis (2005) Bose, *et al*. (2005).

Table A-2

Variables and Their Source

Variables	Source
Per Capita GDP	World Development Indicator
Openness (Imports+ Export)	World Development Indicator
Population Growth	World Development Indicator
Gross Fixed Capital Formation	World Development Indicator
Total Revenue	Government Finance Statistics
Tax Revenue	Government Finance Statistics
Deficit	Calculated
Seigniorage	Calculated
Total Expenditure	Government Finance Statistics
Reserve Money	International Finance Statistics
Consumer Price Index (CPI)	World Development Indicators

APPENDIX II

DESCRIPTION OF VARIABLES

1.1. Government Borrowing

To finance its deficit government has to borrow. Contrary to other fiscal variables, to have the direct measure of government borrowing is often a difficult task in empirical literature.[18] Rodriguez (1994) used the difference between deficit and revenues from printing of money as a proxy for the part of total public spending which is financed through issuing of interest bearing bonds. We also follow this approach to measure the government borrowing.

1.2. Seigniorage

Like government borrowing, the measurement of seigniorage has also been a widely discussed issue in empirical literature. To measure its magnitude different alternative estimates have been suggested.[19] We follow the methodology adopted by Fischer (1982), Walsh (1998) and De Haan, Zelhorst, and Roukens (1993) to measure seigniorage.

1.3. Deficit

From total expenditure and total revenues series we construct a variable deficit by subtracting total government expenditure from total government revenues.

1.4. Trade Openness

Trade openness is the sum of exports and imports of goods and services measured as a share of gross domestic product.

1.5. Reserve Money

The monetary base, high-powered money, comprises central bank liabilities that support the expansion of broad money and credit.

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[18]Bose, Holman and Neanidis (2005).

[19]See Drazen (1985), Klein and Neumann (1990) and Honohan (1996).

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The Relationship between Federal Government Revenues and Expenditures in Pakistan

FAZAL HUSAIN, MUHAMMAD ALI QASIM, and MAHMOOD KHALID

I. INTRODUCTION

A sound fiscal policy is important to promote price stability and sustain growth in output and employment. Fiscal policy is regarded as an instrument that can be used to lessen short-run fluctuations in output and employment in many debates of macroeconomic policy. It can also be used to bring the economy to its potential level. If policymakers understand the relationship between government expenditure and government revenue, continuous government deficits can be prevented. Hence the relationship between government expenditure and government revenue has attracted significant interest. This is due to the fact that the relationship between government revenue and expenditure has an impact on the budget deficit. The causal relationship between government revenue and expenditure has remained an empirically debatable issue in the field of public finance. The question of which variable takes precedence over the other has been a central issue to this debate.

On the theoretical front, several hypotheses have resulted from the causal relationship between government revenue and government expenditure. The first hypothesis is the *Revenue-Spend* hypothesis where raising revenue leads to more expenditure. The causality runs from government revenue to government expenditure. The second hypothesis is *Spend-Revenue* which states that changes in government expenditure cause changes in government revenue. This hypothesis was advocated by Peacock and Wiseman (1979). The third hypothesis is *Fiscal Synchronisation* which states that government revenue decisions are not made in isolation from government expenditure decisions. The decisions are made concurrently. The causality runs from both directions (bi-directional causality). Finally, Wildavsky (1988) and Baghestani and McNown (1994) have advanced a so-called *Institutional Separation* hypothesis under which decisions on taxation are taken independently from the allocation of government expenditure, such that no causal relation between revenue and spending is to be expected.

Narayan and Narayan (2006) gave three reasons why the nature of the relationship between government expenditure and government revenue is important. The first one states that if the revenue-spend hypothesis holds, budget deficits can be avoided by implementing policies that stimulate government revenue. The second reason states that if the bi-directional causality does not hold, it suggests that government revenue decisions are made independent from government expenditure decisions. This can cause

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high budget deficits should government expenditure rise faster than government revenue. The third reason is that if the spend-revenue hypothesis holds it suggests that the government spends first and pay for this spending later by raising taxes. This will result in the fear of paying more taxes in the future and encourage the outflow of capital.

The relationship between government expenditure and government revenue has been investigated for a number countries. Studies such as Von Fursterburg, Green and Jeong (1986); Anderson, Wallace and Warner (1986) revealed evidence of causality from government expenditure to government revenue for a number of developed countries. This study was supported by Nararayan and Narayan (2006) for Peru and provided evidence of the spend-revenue hypothesis. Other studies found evidence of causality running from government revenue to government expenditure (such as Manage and Marlow, 1986). Narayan (2006) also found evidence of causality from revenue to expenditure for Mauritius, El Salvador, Haiti, Chile and Venezuela. These studies provided evidence of the revenue-spend hypothesis. A number of Studies found evidence of the fiscal synchronisation hypothesis [such as Owoye (1995); Li (2001); Fasano and Wang (2002); Gounder, Narayan, and Prasad (2007)]. They found evidence of bi-directional causality between government expenditure and government revenue.

Despite the fact that the relationship between government revenue and government expenditure is important to evaluate, empirical research on this issue in Pakistan is scarce. Two studies, Hussain (2005) and Aisha and Khatoon (2010) while examining the causal relation between Government expenditure and Tax Revenue and between Government expenditure and Government revenue found unidirectional causality from expenditure to revenue. The objective of this study is to reexamine the issue and tests the validity of the various hypotheses for the period 1978-79 to 2008-09. The rest of the paper is organised as follows. Section 2 presents some features of the revenues and expenditures at the federal level in Pakistan. Section 3 discusses the estimation technique and methodology. Section 4 discusses the results, while Section 5 concludes.

II. FEDERAL REVENUES AND EXPENDITURES IN PAKISTAN

It would be useful, before the formal analysis, to look at some characteristics of the revenues and expenditures at the federal level in Pakistan. We start by looking at Figure 1 showing the Federal Budget.

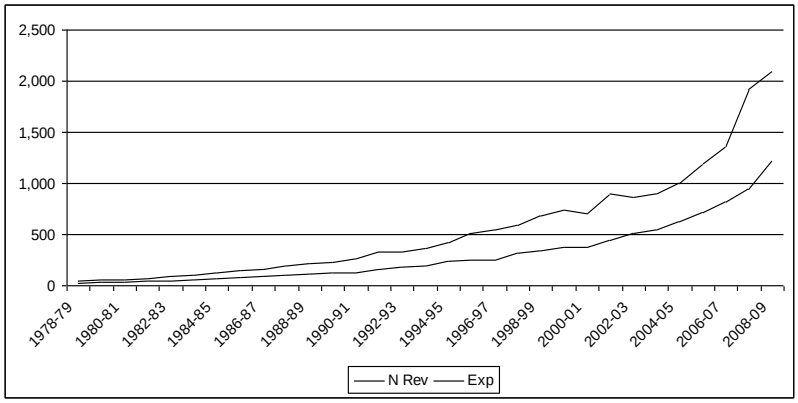

Fig. 1. Federal Budget (in bill Rs)

It can be seen that the gap between net revenues and expenditures increases with the time. It was around quarter bill in late 70s but jumped to Rs 136 bill by 1990-91. With in few years it increased to Rs 258 bill in 1995-96 and then to Rs 343 bill in 1998-99. It approached to trillion in 2007-08 when it was Rs 975 bill. We now look at the composition of revenues by tax and non tax shown in Figure 2.

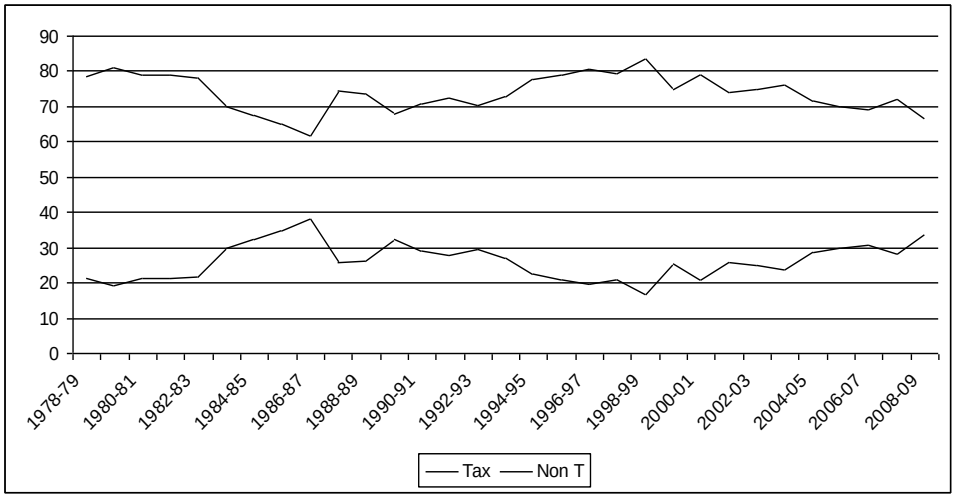

Fig. 2. Composition of Federal Revenues by Tax and Non Tax

The figure shows that in late 70s about 80 percent of the Federal Revenues came from Taxes. However, it gradually came down to 70 percent in 1983-84 and then to 62 percent in 1986-87. In 1990s the share of taxes remained between 70 to 80 percent until it reached 83 percent in 1998-99. After that it gradually came down to 66 percent in 2008-09. The composition of revenues by transfers to provinces and retained by federal is shown in Figure 3.

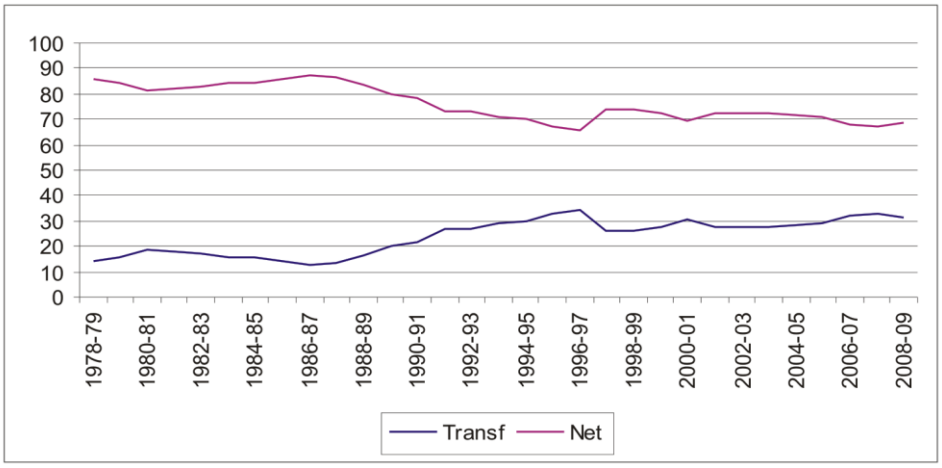

Fig. 3. Composition of Federal Revenues by Transfers and Net

It can be seen that until 1989-90 less than 20 percent of the revenues were transferred to the provinces. In 1991-92 the transfers increased to 27 percent and then to 34 percent by 1996-97. However, it came down after that and remained closed to 30 percent till.

Now we look at the expenditure side. Figure 4 shows the composition of expenditures by current and development.

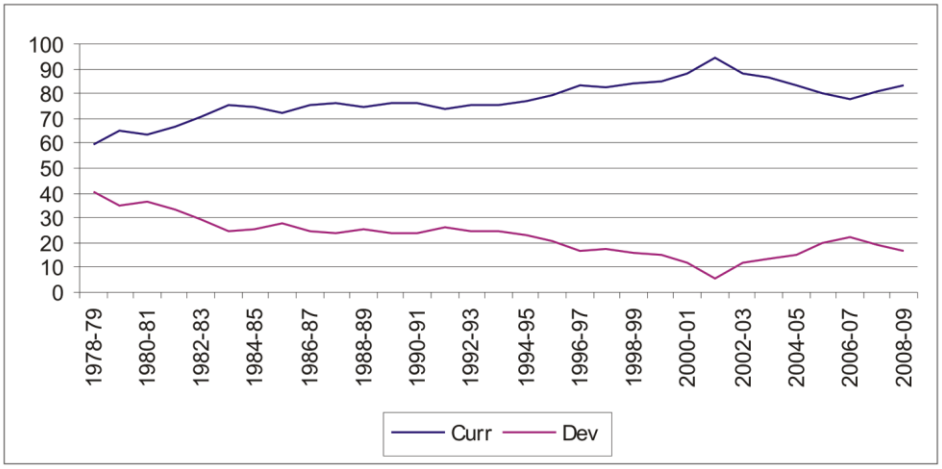

Fig. 4. Composition of Federal Expenditures by Current and Development

In late 1970s the share of development expenditure at Federal level was around 40 percent that gradually came down to 30 percent by 1982-83 and further to 20 percent by mid of 1990s. In 2001-02 it was as low as 5.6 percent. It followed an increasing trend thereafter but still remains below than 20 percent.

Next we look at how much Federal expenditures are met by their revenues shown in Figures 5–7.

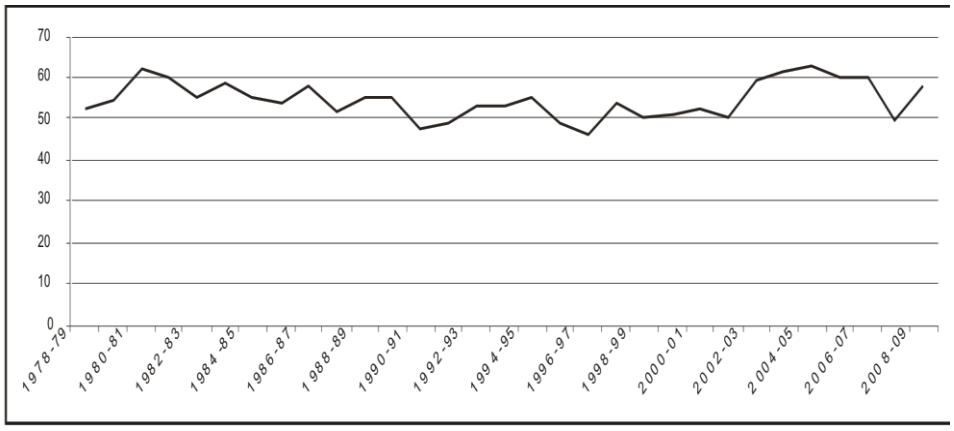

Fig. 5. Financing of Total Expenditures by Net Revenues

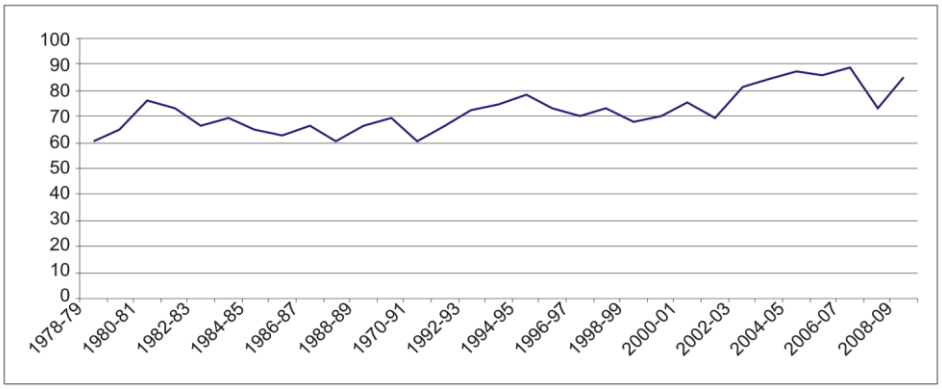

Fig. 6. Financing of Total Expenditures by Total Revenues

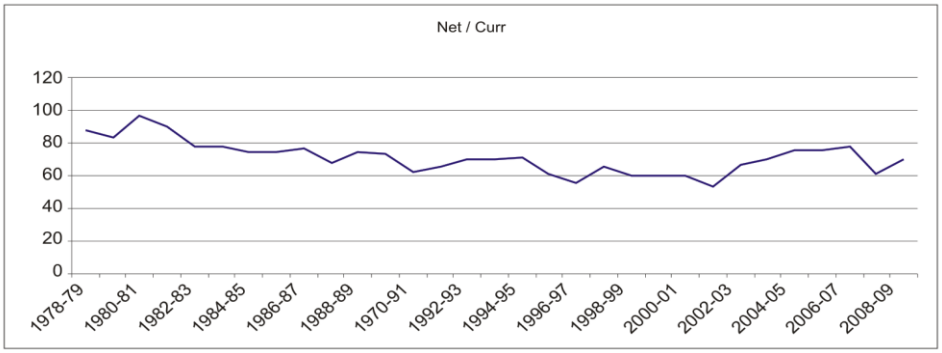

Fig. 7. Financing of Current Expenditures by Net Revenues

It can be observed that, in general, the expenditures at the Federal level are met by 50 to 60 percent of the net revenues. However, in terms of total revenues it shows an increasing trend. In 1980s it ranged between 60–70 percent which was increased to 70–80 percent in 1990s and then to over 80 percent in 2000s. If we look at the current expenditures about 60–80 percent of it is generally met by net revenues.

III. METHODOLOGY

The relation between revenues and expenditures is formally investigated by applying Causality analysis suggested by Toda and Yamamoto (1995) which is described as follows. In Granger sense the causality test is conventionally conducted by estimating Autoregressive or Vector Autoregressive (VAR) models. Granger non-causality test used Wald F-test in an unrestricted VAR model to test the joint significance of some parameters. Sims, *et al.* (1990) and Toda and Phillips (1993) studies have shown that when time series data are integrated or cointegrated then F-test for Granger non-causality is not valid as the test does not have a standard distribution. Toda and Yamamoto (1995) and Dolado and Lütkepohl (1996) proposed the modified Wald test (MWALD) for testing restriction on the parameters of VAR model. In order to apply Toda and Yamamoto (T&Y) approach information about true lag length and maximum order of

integration d_{max} is required but it does not require pre-testing for the cointegration properties of system [Shan and Tian (1998); Zapata and Rambaldi (1997)].

T&Y has shown that pretesting for cointegration rank in Johansen type ECM are sensitive to the values of the nuisance parameters , thus causality inference may be severely biased. Toda and Yamamoto procedure is to fit the Autoregressive or VAR in the level of the variable rather than first difference as in Granger non-causality test. The basic idea of TY approach is to artificially augment the correct order *k*, of the VAR model by maximal order of integration, say d_{max} Once this is done a VAR model with (d_{max} + *k*) order is estimated and then coefficient of last lagged vector are ignored means exclude extra added lags and apply the standard Wald test to test the restriction on the parameters. Specifically we estimate

$$Y_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} X_{t-i} + \sum_{i=n+1}^{d_{\max}} \alpha_{2i} X_{t-i} + \sum_{j=1}^{m} \phi_{1i} Y_{t-j} + \sum_{j=m+1}^{d_{\max}} \phi_{2i} Y_{t-j} + \varepsilon_{t1}$$

$$X_t = \delta_0 + \sum_{i=1}^{k} \delta_{1i} X_{t-i} + \sum_{i=k+1}^{d_{\max}} \delta_{2i} X_{t-i} + \sum_{j=1}^{l} \varphi_{1i} Y_{t-j} + \sum_{j=l+1}^{d_{\max}} \varphi_{2i} Y_{t-j} + \varepsilon_{t2}$$

The initial lag length *n*, *m*, *k*, and *l* are chosen using AIC criterion, whereas e_{1t} and e_{2t} are error terms. From 1st equation, Granger causality from *X* to *Y* implies $\alpha_{1i} \neq 0$; similarly in 2nd Equation Y Granger cause *X*, if $\varphi_{1j} \neq 0$. T&Y proves that Wald statistic used converges in distribution to a 2χ , no matter whether the process is stationary or non-stationary and whether it is cointegrated or not .

IV. RESULTS

In formal causality analysis we use two types of revenues, that is, total and net revenues. The former implies the revues left to the federal government after transfers to the provinces. Similarly two types of expenditures, that is, total and current expenditures are used. Using annual data on Federal Government of Pakistan's Revenues and Expenditures from 1978-79 to 2008-09 we obtain the following results.

Table 1 presents the results when total expenditures type is used. It can be clearly seen that both types of revenues, total and net, are caused by total expenditures but not vice versa implying clear evidence of a unidirectional causality from expenditures to revenues.

Table 1

Causality between Revenues and Total Expenditures

Dependent Variable: Total Revenue				Dependent Variable: Net Revenue			
Variables	Coeff.	t-values	Prob.	Variables	Coeff.	t-values	Prob.
Const.	–5.883	–0.878	0.389	Const.	–8.393	–1.350	0.189
TR(–1)	0.859	3.830	0.001	NR(–1)	0.664	2.670	0.013
TE(–1)	0.168	2.340	0.028	TE(–1)	0.252	3.960	0.001
Dependent Variable: Total Expenditure				Dependent Variable: Total Expenditure			
Const.	10.277	0.562	0.580	Const.	–9.690	–0.501	0.621
TR(–1)	0.073	0.118	0.907	NR(–1)	–0.340	–0.438	0.665
TE(–1)	0.246	1.250	0.223	TE(–1)	0.500	2.520	0.019
Conclusion: Undirectional from Expenditure to Revenue				Conclusion: Undirectional from Expenditure to Revenue			

The results with the other type, that is, the current expenditures are presented in Table 2.

Table 2

Causality between Revenues and Current Expenditures

Dependent Variable: Total Revenue				Dependent Variable: Net Revenue			
Variables	Coeff.	t-values	Prob.	Variables	Coeff.	t-values	Prob.
Const.	4.001	0.552	0.586	Const.	–5.426	–0.845	0.406
TR(–1)	0.705	3.440	0.002	NR(–1)	0.467	1.890	0.070
TE(–1)	0.257	4.010	0.001	TE(–1)	0.314	5.330	0.000
Dependent Variable: Total Expenditure				Dependent Variable: Total Expenditure			
Const.	29.292	1.250	0.224	Const.	1.048	0.044	0.965
TR(–1)	1.123	1.690	0.104	NR(–1)	0.316	0.349	0.730
TE(–1)	0.234	1.130	0.270	TE(–1)	0.556	2.570	0.017
Conclusion:				Conclusion:			
Undirectional from Expenditure to Revenue				Undirectional from Expenditure to Revenue			

It is clearly observed that the results are not different from the previous table, that is, causality runs from expenditures to revenues with out any feed back. Hence it can be concluded that the results support the Barro hypothesis for Pakistan, that is, government expenditures cause's revenues. This means that government first spends and then, later, to pay for this expenditure, it raises taxes.

V. CONCLUSION

This paper investigates the relation between expenditures and revenues at the federal level of the government of Pakistan for the period 1978-79 to 2008-09 using the Toda and Yamamoto (1995) methodology. The results show that there is a unidirectional causality from expenditures to revenues. The results revealed evidence of the *spend-revenue* hypothesis for Pakistan. This suggests that government first spends and then, later, to pay for this expenditure, it raises taxes. Potential investors may construe this government behaviour negatively—that is, investment decisions may take into account the possibilities of paying higher taxes in future.

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The Causality between Revenues and Expenditure of the Federal and Provincial Governments of Pakistan

TAHIR SADIQ

1. INTRODUCTION

Large fiscal deficits and a growing debt burden have been a key element of the structural problems faced by the economy of Pakistan. During the last three years, for example, the budget deficit has averaged almost 6 percent of the GDP and the public debt has approached the level of 60 percent of the GDP. Targets agreed with IMF have been seriously violated and the SBA with the Fund has floundered because of the inability to control the fiscal deficit.

There is a growing perception that one of the root causes of inflation is the large borrowing from the Central Bank to finance the deficit. This has resulted in a popular demand for cutting down of unproductive expenditure and observing austerity along with implementation of a strong programme of reforms to raise the low tax to GDP ratio of the country by broad-basing the tax system and eliminating exemptions. The fundamental question is whether measures at reducing the fiscal deficit will have a, more or less, permanent impact. If an increase in tax revenue is accompanied subsequently by a rise in expenditure then the impact on the deficit is likely to be temporary or limited in character. Alternatively, if a cut in expenditure leads to a slackening of the fiscal effort then the gains are also not lasting in nature.

Therefore, a study of the direction of causality between tax revenue and expenditure is essential to determine the optimal strategy for deficit reduction. There is need to understand if governments in Pakistan first tax and then spend or first spend and then tax.

In other words, is there 'fiscal synchronisation' of the type pointed out by Frusternberg, *et al.* (1986)?

The paper is organised as follows: Section 2 reviews the literature on the relationship between taxation and expenditure. Section 3 describes the methodology and the data. Section 4 presents the results for the federal and the provincial governments combined, and Section 5 presents the conclusions and policy recommendations.

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2. LITERATURE REVIEW

Different studies have been undertaken to understand the relationship between government revenue and expenditure. Three hypotheses have been postulated by Aziz, *et al.* (2000), first, a bi-directional relationship between expenditure and revenue, second, a unidirectional causality that runs from revenue to expenditure and, third, the causality from expenditure to revenue. All these hypotheses have important implications for the strategy to solve the budget deficit problem. Some support to the fiscal synchronisation hypothesis is given by Miller and Russek (1990) who concluded that there is bidirectional causality between taxes and government expenditures in the federal, state and local sectors of the USA. Kirchgassner and Prohl observe a bidirectional causality between revenue and expenditure both in the short run and long run for the Swiss federal government. Bohn (1991) shows that 50-65 percent of all deficits are caused by unexpected tax cuts and 65-70 percent are caused by high government expenditures, so there is a significant evidence in favour of both *tax-and-spend and the spend-and-tax hypotheses.* High deficits have been corrected by the combination of tax increase and cuts on expenditure. Payne (1998) shows that among 48 states of the USA, 24 support the tax-spend hypothesis, 8 the spend-tax hypothesis and 15 the hypothesis of fiscal synchronisation, which means revenue and expenditure are jointly determined.

Some of the studies have shown that there is unidirectional causality from government revenues to expenditures. Marlow and Manage (1987) found a unidirectional causality from tax revenues to expenditures on the state data of USA for all almost lag structures. For local governments they find causality from revenues to expenditure for the *shortest lag length* of two years, while for other lags revenue and expenditure appear independent of each other. Moalusi (2007) finds unidirectional causality from revenue to expenditure in Botswana. Owoye (1995) demonstrates that there is bidirectional causality between expenditures and taxes in five countries of G7, but in Italy and Japan causality is from taxes to expenditures.

The third hypothesis of first spend and tax later is also supported by many studies. For example, Barro (1979) indicated that during war and post war periods there is an impact of temporary increase in government expenditures on public debt which eventually leads to a rise in taxes.

The causality between taxes and expenditures for federal and provincial governments combined of Pakistan was studied by Hussain (2005) for the period 1973-2003. The author concludes that there is unidirectional causality from government expenditure to revenue. He offers two simultaneous solutions, first, to expand the tax base and ensure higher collection of taxes and second to cut the excess current expenditures. Further the work of Aisha, *et al.* supported spend and tax hypothesis in case of Pakistan as taxes revenues are determined by government expenditure. The authors performed a co-integration test which suggests that there exists a long run relationship between revenue and expenditure in Pakistan.

3. METHODOLOGY AND DATA

Various approaches can be adopted to study the relationship between revenues and expenditure, including Co-integration test, Granger causality test, Error correction model and Vector Autoregressive mode (VAR). Granger (1969) argued the revenues may be

explained by past revenues and expenditures. If the past values of expenditure explain current revenues then there exists causality expenditure to revenue. If the opposite is the case then the flow of causation is from revenue to expenditure.

The simple model which tests the causal relationship between revenues and expenditures presented by Granger (1969) is as follows:

$$X_t = \sum_{j=1}^{m_1} a_j X_{t-j} + \sum_{j=1}^{m_2} b_j Y_{t-j} + \varepsilon_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

$$Y_t = \sum_{j=1}^{m_3} c_j X_{t-j} + \sum_{j=1}^{m_4} d_j Y_{t-j} + \eta_t \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Here the error terms, ε_t and η_t are uncorrelated series with means that $E\ [\varepsilon_t, \eta_t]=0$. The *ms* are the given lag lengths. In the above equations if *bj* is not equal to zero it implies that direction of causality is from *Y* to *X* and similarly if *cj* is not equal to zero than the causality is from *X* to *Y*. If both *bj* and *cj* are not equal to zero there is a bi-directional causality between *X* and *Y* and if both *bj* and *cj* are equal to zero there exist no causal relationship between *Xt* and *Yt*.

For our research, *X* corresponds to expenditure and *Y* to tax revenues. The expenditure variable is designated as *EXP* and the revenue variable as *REV*.

Lag lengths, m, of the above equations are determined through Akaike Information Criterion (1969) and Schwarz Criterion (1978). Initially Equation 1 of expenditure is regressed on the lagged variables of expenditure, excluding revenue. Appropriate lag is selected where AIC are SC are minimum. Keeping this lag fixed, lags for the revenue have been introduced until AIC and SC are minimised. Same procedure is applied to Equation 2 for the determination of the optimal lag lengths of expenditure and causing revenue.

The null and alternate hypotheses for the equation 1 are as follows:

Ho: REV does not Granger Cause EXP.

H1: REV does Granger Cause EXP.

For the Equation 2 null and alternate hypotheses are as follows:

Ho: EXP does not Granger cause REV.

H1: EXP does Granger Cause REV.

If $bj = 0$ of Equation 1 and $cj \neq 0$ of Equation 2, it implies there is a unidirectional causality from expenditure to revenue. Similarly if $bj \neq 0$ of Equation 1 and $cj = 0$ of Equation 2 implies unidirectional causality from revenue to expenditure. If both $bj \neq 0$ of Equation 1 and $cj \neq 0$ of Equation 2 implies a bidirectional causality, finally if $bj = 0$ of Equation 1 and $cj = 0$ of Equation 2 implies no link between expenditure and revenue. We also expect that $\Sigma\ aj < 1$, $\Sigma\ bj < 1$, $\Sigma\ cj < 1$ and $\Sigma\ dj < 1$**.** OLS regression is applied to both the Equations 1 and 2 to check the significance of estimates, at the 5 percent significance level.

Data on federal and provincial tax revenues, current and development expenditure have been taken for the period, 1980-81 to 2009-10, from Pakistan

Economic Survey and the State Bank of Pakistan. Revised estimates for the last year have been obtained from the website of fiscal operations maintained by the Ministry of Finance, Islamabad. Non-tax revenues, which include interest income, profits and dividends and miscellaneous receipts, have been excluded from the analysis as they are mostly exogenous in character. The series have been converted into real percapita magnitudes in order to avoid problems of non-stationarity, and are presented in Table 1.

Table 1

Percapita Real Tax Revenue and Expenditure of the Federal and Provincial Governments Combined (At Constant Prices of 1999-2000)

Years	Per Capita Real Total Rev (PCRTTR)	Per Capita Real Total Exp (PCRTE)	Per Capita Real Current Exp (PCRTCE)	Per Capita Real Dev Exp (PCRTDE)
1981	2182	4104	2851	1254
1982	2088	3767	2616	1152
1983	2184	4025	2852	1172
1984	2186	3971	2935	1037
1985	2020	4139	3029	1110
1986	2157	4617	3243	1373
1987	2230	4987	3731	1256
1988	2420	5424	4019	1405
1989	2536	5323	4050	1273
1990	2650	5355	4001	1354
1991	2470	5494	4119	1375
1992	2776	5969	4273	1696
1993	2739	5748	4491	1256
1994	2630	5275	4242	1033
1995	2951	5344	4316	1027
1996	3088	5699	4663	1037
1997	2852	5194	4373	821
1998	2714	5518	4612	906
1999	2693	5229	4420	809
2000	2786	5579	4814	765
2001	2926	5132	4599	533
2002	2852	5209	4722	487
2003	3111	5732	5052	680
2004	3291	5721	4638	1083
2005	3401	6005	4647	1357
2006	3681	6853	5058	1795
2007	3676	8020	6128	1892
2008	3864	8899	7244	1655
2009	3832	8046	6496	1550
2010	3879	8518	6954	1563

4. EMPIRICAL RESULTS

4.1. Tax Revenue and total Expenditure

The regression results of causality between total tax revenues and total expenditures of the federal and provincial governments combined are given below. Total tax revenue consists of federal total tax and provincial total tax revenues. Total expenditure is the sum of federal and provincial current and total development expenditure. The results show that there does not exist any causal relationship between total government revenue and total expenditure. The null hypothesis that total revenue does not Granger cause total expenditure is accepted against the alternate that total revenue does Granger cause total expenditure at 5 percent significance level. Similarly, the null hypothesis that total tax expenditure does not Granger cause total revenue is also accepted against the alternate that total expenditure does Granger cause total revenue.

One of the principal reasons for the lack of responsiveness of expenditure to changes in revenue is the downward rigidity in major expenditure heads like defense, debt servicing, costs of civil administration, etc. Development expenditure is more discretionary in character but in the presence of a large throwforward of on-going development schemes it is difficult to cut back the size of the PSDP in the short run.

On the taxation size the inability to mobilise revenue quickly in the event of slippages on the expenditure side is due to the absence of a tax culture given the large size of the informal economy, presence of strong lobbies, low efficiency of tax administration and low elasticity of the tax system.

The failure in raising tax revenues in the presence of a rapidly growing trend in expenditure is vividly demonstrated by the experience after 2003-04 when the fiscal deficit was at its historically lowest level of 2.4 percent of the GDP. The emergence of the War on Terror and the resulting rise in security spending along with more recent problem of large subsidies to public sector enterprises and introduction of transfer payments have increased public expenditure by almost three percentage points of the GDP in the last six years. But the tax- to -GDP ratio has remained stagnant at about 10 percent of the GDP and, consequently, the fiscal deficit has risen to 6.3 percent of the GDP by 2009-10.

Results of the Granger Causality test between total tax revenues and total expenditures are given in Table 2. The underlying regressions are presented in Table 3.

Table 2

Results of the Granger Causality between Tax Revenues and Total Expenditure

	Independent Variables		p-values			
Dependent Variable	Lag of Expenditure	Lag of Revenue	Lag Exp	Lag Rev	Inference	Causality
Percapita Real Exp	1	1	0.0001	0.115	Accept null hypothesis	No causation
Percapita Real Rev	1	1	0.611	0.000	Accept null hypothesis	

Table 3

Results of the Regressions between Tax Revenues and Total Expenditure

Dependent Variable: PCRTE
Sample (Adjusted): 1982 to 2010
Included Observations: 29 after Adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	–220.685	448.894	-0.492	0.627
PCRTE (-1)	0.761	0.166	4.587	0.0001
PCRTTR(-1)	0.606	0.371	1.633	0.115
R-Squared	0.888	Mean dependent var		5682.454
Adjusted R-Squared	0.879	S.D. dependent var		1281.317
S.E. of Regression	445.170	Akaike info criterion		15.132
Sum Squared Resid	5152586.000	Schwarz criterion		15.274
Log Likelihood	–216.421	Hannan-Quinn criter		15.177
F-statistic	102.982	Durbin-Watson stat		1.918
Prob(F-statistic)	0.000			

Dependent Variable: PCRTE
Sample (Adjusted): 1982 to 2010
Included Observations: 29 after Adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	48.577	156.293	0.311	0.758
PCRTTR(-1)	0.945	0.129	7.313	0.000
PCRTE(-1)	0.030	0.058	0.514	0.611
R-Squared	0.928	Mean dependent var		2851.148
Adjusted R-Squared	0.922	S.D. dependent var		556.236
S.E. of Regression	154.996	Akaike info criterion		13.022
Sum Squared Resid	624620.200	Schwarz criterion		13.164
Log Likelihood	–185.825	Hannan-Quinn criter		13.067
F-statistic	167.303	Durbin-Watson stat		2.182
Prob(F-statistic)	0.000			

Where

PCRTE = Real percapita expenditure,
PCRTTR = Real percapita tax revenues.

It may be noticed that, although not statistically significant, there appears to be some evidence of weak causation from tax revenues to expenditure. Hussain (2005) had concluded that there was causality from expenditure to revenue in the Pakistani context for an earlier period upto 2002-03. Clearly, the relationship has broken down due to the developments thereafter as described above.

4.2. Tax Revenue and Current Expenditure

We now test for the relationship between total tax revenue and total current expenditure. The results clearly show that there does not exist a causal relationship between total tax revenue and total current expenditures. The null hypothesis that total revenue does not Granger cause total current expenditure is accepted against the alternate that total revenue does Granger cause total current expenditure at 5 percent level of significance. Similarly the null hypothesis that total current expenditure does not Granger cause total revenue is also accepted against the alternate that total current expenditure does Granger cause total revenue.

Results of the Granger Causality test between total tax revenues and current expenditures are given in Table 4. The underlying regressions are presented in Table 5.

Table 4

Results of the Granger Causality Test Between Revenues and Current Expenditure

	Independent variables		p-values			
Dependent Variable	Lag of Expenditure	Lag of Revenue	Lag exp	Lag rev	Inference	Causality
Percapita Real Current Exp	1	2	0.005	0.239	Accept null hypothesis	No causation
Percapita Real Rev	1	1	0.430	0.000	Accept null hypothesis	

The results of regressions are given in Table 5.

Table 5

Results of Regressions of Tax Revenue and Current Expenditure

Dependent Variable: PCRTE
Sample (Adjusted): 1982 to 2010
Included Observations: 29 after Adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	–502.572	402.829	–1.248	0.224
PCRTCE(-1)	0.529	0.172	3.070	0.005
PCRTTR(-1)	0.397	0.487	0.815	0.423
PCRTTR(-2)	0.587	0.486	1.207	0.239
R-Squared	0.904	Mean dependent var		4561.522
Adjusted R-Squared	0.892	S.D. dependent var		1079.009
S.E. of Regression	354.477	Akaike info criterion		14.711
Sum Squared Resid	3015693	Schwarz criterion		14.901
Log Likelihood	–201.950	Hannan-Quinn criter.		14.769
F-statistic	75.391	Durbin-Watson stat		1.900
Prob(F-statistic)	0.000			

Continued—

Dependent Variable: PCRTE Sample (Adjusted): 1982 to 2010 Included Observations: 29 after Adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	87.083	163.671	0.532	0.599
PCRTTR(-1)	0.901	0.140	6.418	0.000
PCRTCE(-1)	0.057	0.071	0.801	0.430
R-Squared	0.929	Mean dependent var		2851.148
Adjusted R-Squared	0.923	S.D. dependent var		556.236
S.E. of Regression	153.894	Akaike info criterion		13.008
Sum Squared Resid	615767.100	Schwarz criterion		13.150
Log Likelihood	–185.618	Hannan-Quinn criter		13.052
F-statistic	169.896	Durbin-Watson stat		2.142
Prob(F-statistic)	0.000			

Where PCRTCE = Real percapita current expenditure

4.3. Tax Revenue and Development Expenditure

The results of the Granger Causality Test of the relationship between total tax revenue and development expenditure is shown below.

Table 6

Results of the Granger Causality Test between Revenues and Development Expenditure

	Independent variables		p-values			
Dependent Variable	Lag of Expenditure	Lag of Revenue	Lag Exp	Lag Rev	Inference	Causality
Percapita Real Development Exp	1	1	0.000	0.564	Accept null hypothesis	No causation
Percapita Real Rev	1	1	0.848	0.000	Accept null hypothesis	

Null hypothesis that total revenue does not Granger cause total development expenditure is accepted against the alternate that total revenue does Granger cause total development expenditure at 5 percent level of significance. Similarly, the null hypothesis that total development expenditure does not Granger cause total revenue is also accepted against the alternate that total development expenditure does Granger cause total revenue. The underlying regressions between total tax revenues and development expenditure are presented in Table 7.

Table 7

Results of Regressions Between Tax Revenues and Development Expenditure

Dependent Variable: PCRTE
Sample (Adjusted): 1982 to 2010
Included Observations: 29 after Adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	84.698	217.407	0.390	0.700
PCRTDE (-1)	0.832	0.114	7.268	0.000
PCRTTR(-1)	0.044	0.076	0.584	0.564
R-Squared	0.702	Mean dependent var		1188.028
Adjusted R-Squared	0.679	S.D. dependent var		360.107
S.E. of Regression	203.970	Akaike info criterion		13.572
Sum Squared Resid	1081700	Schwarz criterion		13.713
Log Likelihood	-193.787	Hannan-Quinn criter		13.616
F-statistic	30.637	Durbin-Watson stat		1.514
Prob(F-statistic)	0.000			

Dependent Variable: PCRTE
Sample (Adjusted): 1982 to 2010
Included Observations: 29 after Adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	55.537	165.926	0.335	0.741
PCRTTR (-1)	1.008	0.058	17.420	0.000
PCRTDE(-1)	–0.017	0.087	-0.194	0.848
R-Squared	0.927	Mean dependent var		2851.148
Adjusted R-Squared	0.922	S.D. dependent var		556.236
S.E. of Regression	155.670	Akaike info criterion		13.031
Sum Squared Resid	630064	Schwarz criterion		13.173
Log Likelihood	–185.950	Hannan-Quinn criter		13.075
F-statistic	165.745	Durbin-Watson stat		2.223
Prob(F-statistic)	0.000			

Where PCRTDE = Real percapita Development expenditure.

Contrary perhaps to expectations, even the relatively discretionary part of expenditure on development is not related to tax revenues. As highlighted in Table 1, development expenditure has shown a steady declining trend in real percapita terms from 1992 to 2002, and thereafter a rising trend. This trend has proceeded independently of the trend in tax revenues.

5. CONCLUSIONS AND RECOMMENDATIONS

The Granger Causality test between total tax revenues and total expenditure of the federal and provincial governments combined has revealed the absence of any significant relationship. Extension of the test to determine the causality between tax revenues and the two major components of expenditure, viz., current expenditure and development expenditure, has also been unsuccessful.

The implication of these findings is that successive governments of Pakistan have been unstable to control the size of the fiscal deficits during the periods when public expenditure has been rising sharply, as happened, for example, after 2003-04 by responding with efforts at mobilising additional resources through the tax system. Alternatively, when revenues were stagnant in the late 90s adequate efforts were not made to control the level of public expenditure. These failures highlight the weaknesses in fiscal management in country.

However, there is a positive downside to the findings. The absence of any causality between tax revenues and expenditure does indicate that if vigorous efforts are made now to raise the tax-to-GDP ratio then this need not translate into increase in expenditure and there is, therefore, the likelihood of success of this strategy in reducing the fiscal deficit. Alternatively, if expenditure, especially on the current side, is curtailed then this is unlikely to be accompanied by any slackening of the fiscal effort. It is clear that the time has come for containing the fiscal deficit on both the revenue and expenditure front and thereby reducing inflationary pressures in the economy.

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What is Hidden, in the Hidden Economy of Pakistan? Size, Causes, Issues, and Implications

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1. INTRODUCTION

The informal economy is initially considered as the subsidiary sector in terms of its contribution to the overall economy. However, it received the focus of attention with the publication of Peter Guttmann's estimates for sizing the informal economy (i.e. US $ 200 billion in 1976) for the US economy especially in the context of achieving the goal of inclusive growth and development. The informal economy is recognised with different names in different countries/regions throughout the world. For example, the Swedish and Russian term it as "Hidden Economy", the English call it "Fiddle", the Japanese recognise it as "Hidden Incomes", the French identify it as "Travail au noir", the Italian consider it as "The Lavorno Nero", while in Pakistan it has been analysed as an "Hidden Economy" or "Informal Economy".

The informal economy includes all those economic activities which are not reported or not included in the National Income Accounts. These include both legal and illegal economic activities. According to the Resolution adopted by the 15th International Conference of Labour Statisticians (ICLS), the legal side of the informal economy comprises of units such as household enterprises, engaged in the production of goods and services with the primary objective of generating employment and income to the persons concerned, not necessarily with the deliberate intention of evading the payment of taxes or other legislative or administrative provision. These units typically operate at a low

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level of organisation, on a small scale, and with labour relations mostly based on causal employment. Expenditure for production is often indistinguishable from household expenditure. The units as such cannot engage in transactions or enter contracts with other units, nor incur liabilities. A self explanatory Figure 1 provides a simple visual structure of formal and informal sectors and their inter linkages.

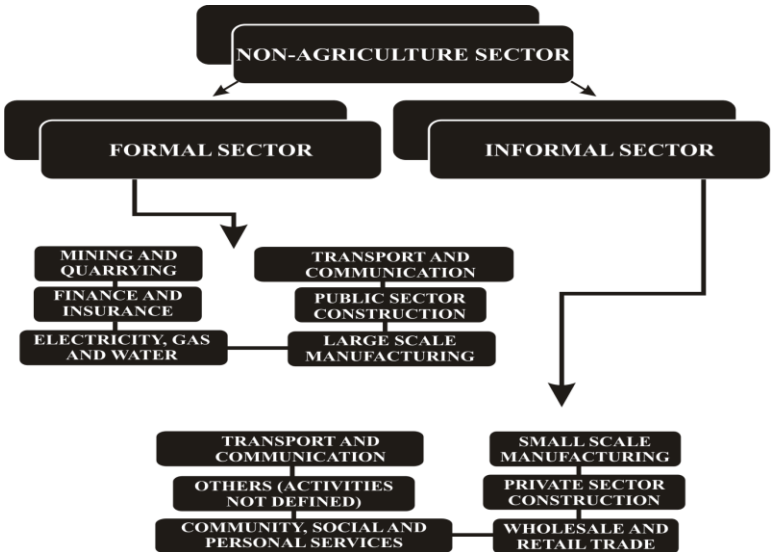


Fig. 1. Hierarchical Structure of Formal and Informal Sectors[1]

The illegal economic activities as part of the informal economy include; smuggling, theft, prostitution, narcotic/forbidden commodity trade, gambling etc. National Income Accounts (NIA) as per design also exclude many activities such as moonlighting, unregistered employment, unregistered income earned through FOREX, under reporting of retail sales, illegal employment (child labour), suspect inventory evaluations, transfer of money through hundi, hidden rentals and barter business. All these economic activities by their nature act as an attempt to evade huge amount of taxes, thereby causing burden on the public treasury.

The persistent failure to manage economic system as reflected by a low tax-GDP ratio, an incredible increase in energy requirements, persistent upward inflationary movements especially in food items and consumer durables explains much of underlying truth of neglecting the quantification, causes and implications of the informal economy with in the public policy framework. Moreover, the informal economy appears to have great respect for geographical and geopolitical boundaries especially in the current phase of Pak-India and Pak-Afghanistan relations and Pakistan's logistic support to NATO forces in the wake of War against Terrorism. The destruction of 2005 Earthquake and calamities of the recent flood in 2010 add a greater potential to the expansion of the hidden economy. From socio-economic point of view, the unbridled price hike especially

[1]The sectors in the formal sector and informal sector are identified only in the context of Pakistan on the basis of reviewed literature and discussions with the experts in the relevant fields.

in food items and consumer durables, incessant increase in the prices of electricity and petroleum goods, the implementation of new GST/VAT system may give an informal attitude to the general living style.

At international level, there is much contemporary debate about the role of the informal sector in an economy and its potential in lessening poverty. The size and significance of the informal sector in Asia, contributing about 41 percent in the GDP, makes it a vital point of analysis for understanding the brunt of the downturn in the emerging economies of the region. Thus, it is the need of the hour to find out whether or not the informal sector cushions against the self-perpetuating evil of poverty, and helps the stricken economy to escape from the steamrolling noose of recession in Pakistan.

These facts motivate us to undertake the current study and analyse the informal economy from different aspects in Pakistan. Ideally, the correct measurement of the informal economy requires the aggregation of all legal/illegal hidden economic activities. Since, it requires an effective check and balance which is quite unworkable especially in the underdeveloped and the developing economies. The only way left which is rather crude in its nature, is the indirect approach to estimate the size of the informal economy with the available data on macro economic variables. Our contribution in this paper is to estimate the size of informal economy through five indirect approaches namely; Monetary Approach, Modified Monetary Approach through Dynamic OLS (DOLS), Electricity Consumption Approach, Structural Multi-Indicators Multi-Causes (MIMIC) Approach and Labour Market Approach. This blend of various approaches has been adopted for the first time in case of Pakistan.[2] The other objectives of this study include; the determination of causes, issues/implications of the informal economy in Pakistan and provide useful policy implications in order to ascertain the desired policy goals of inclusive growth and development especially in the context of the 18th amendment and the 7th National Finance Commission (NFC) Award.

The rest of the paper is organised as follows: Section 2 outlines the review of relevant literature. Section 3 discusses the data and empirical methodology in detail. Section 4 analyses the results and discussions. Section 5 contains the causes and implications of the informal economy which emerge from the analysis. Finally, Section 6 comprises of the conclusion (also containing some public policy guidelines) of the paper whereas results are reported in the appendix part of the paper.

2. REVIEW OF RELEVANT LITERATURE

The informal economy by its structure works through the proliferation of labour-intensive undertakings and backward and forward linkages with the formal economy; see for instance, Williams and Tumusiime-Mutebile (1978). Consequently, it acts as a cushion against poverty and income inequality, especially during external shocks: see for example, Frey (1997). Across the emerging market economies, the informal sector continues to expand in both absolute and relative terms. Its growth has been largely due

[2]In authors' opinion, there is a need to conduct this study to produce more accurate and reliable estimates of the size of the informal economy over the period of analysis with the help of different approaches at once. A study by Ahmed (2009) surveyed various empirical studies on informal economy in the case of Pakistan. The author shows his reservations on the empirical estimates of the size of informal economy available in all previous studies. He concludes that informal economy and tax evasion estimates are unreliable and highly doubtful.

to the weak capacity of the formal private sector to generate adequate employment and incomes due to high growth rates of labour force and rural-urban migration in the developing areas as noted by Sethuraman (1997).

Over the decades, the informal economy started to attract the attention of economists and policy makers as a result of which many approaches have been adopted to estimate the actual size of the informal economy, but each is tied with its own limitations. Out of all, first one is the labour market approach, the roots of which originate from the labour market by considering the number of workers actively participating in the informal economy and their total number of hours worked. However, Pyle (1989) argues that it is not possible to accurately measure the number of hours worked and the average productivity. Moreover, this approach is useful for countries having small informal economy.

Feige (1979) strived to guesstimate the size of the US economy from the standpoint of payments and transactions. Based on famous Fischer's equation of exchange $MV=PT$, he assumed the aggregate money supply to be a good quality indicator of the total size of the informal economy. The transaction method resulted in a negative hidden economy for the period 1939-68, which illustrated a falling informal economy in the era of World War II. An earlier attempt on this approach was made by Cagen (1958), who was interested in explaining the long run behaviour of the currency to money supply over the period 1875-1955.[3]

Tanzi (1980) re-hypothesised the same link to obtain estimates for the US black economy. He assumed that currency was used to carry out transactions in the black economy and high taxes were responsible for the increased size of the black economy. In addition to mentioned studies, O'Higgins (1981) also used the monetary approach by taking the ratio of currency to M1 and ratio of currency to M3 as dependent variables in estimating the underground economy for United States for the period 1960-80. Schneider (2002) estimated the size of the informal economy in 110 developing, transitional and OECD countries by using the currency demand approach, the physical input method and the structural modelling approach. The results concluded that the average size of the informal economy as a percentage of official GNI in the year 2000 was 41 percent for the developing countries, 38 percent for the transitional countries and 18 percent for the OECD countries. A large burden of taxation and social security contributions combine with government regulations were the main determinants of the size of the informal economy.

For many years, the informal economy has been the centre of attention of many researchers in Pakistan,[4] making tremendous efforts to quantify the actual size of this part of the overall economy through various approaches. Shabsigh (1995) adopted the same route of monetary approach to estimate the underground economy for the period 1975-91. He used ratio of currency in circulation to total demand deposits (M2-currency in circulation) as a dependent variable while real per capita income, real rate of interest, per capita banking services, average taxes on imports, exports and domestic activities were

[3]According to Cagen (1958, page. 312), "Some people evade taxes by making as many transactions as possible with currency and not reporting to the tax collector".

[4]Earlier attempts have been made by Burki (1982) who highlights various issues related with urban informal sector of Pakistan and Ahmad, *et al.* (1991) who studied the dynamics of learning and earning profile of Pakistan's informal sector.

chosen as explanatory variables. He concluded that the size of the black economy was 21 percent of the total GDP in 1975 and declined slightly to 20.4 percent in 1990, thus implying a torpid underground economy.

Ahmed and Ahmed (1995) adopted the monetary analysis to estimate the size of the black economy using data for the period 1960-90 through Tanzi's approach. The inclusion of bearer bonds along with currency in circulation revealed that the level of tax evasion has increased over the number of years but the black economy as a percentage of GDP registered a decline in Pakistan. They concluded that the size of the informal economy declined from 52 percent in 1960 to 35 percent in 1990.

Aslam (1998) also used Tanzi's methodology to estimate the size of the underground economy by taking the log-ratios of currency in circulation and foreign currency accounts to M2 as a dependent variable, while log of total tax revenues as a percentage of GDP, log of interest rate on time deposits and log of dummy variable for period 1991-98 were taken as independent variables. Author's estimates reveal that the underground economy has been increased from 29 percent in 1960 to 43.9 percent in 1990.

Iqbal, *et al*. (1998) used the ratio of currency in circulation to M2 as the dependent variable while real interest rate, real per capita income growth, banking services, domestic taxes as percentage of GDP, international trade taxes as percentage of GDP, dummy variable for the period 1988-96 and a lagged dependent variable to account for the inertia in the money market were taken as independent variables. They have also estimated the sectoral decomposition of the underground economy. The results concluded that the underground economy increased from 20.2 percent in 1973 to 51.3 percent in 1996.

Khalid (2002) estimated the underground economy for Pakistan using monetary approach but his estimates are different from those of Kemal (2003) due to different benchmark periods taken into consideration. In addition to this, Khalid (2002) added the real rate of interest and GDP per capita as independent variables while Kemal (2003) used GDP growth as a proxy to economic development, the results became evident that the underground economy as a percentage of GDP increased after 1991, reached a maximum in 1998 and then declined.

Yasmin (2004) adopted the monetary approach to measure the underground economy (UGE) through tax evasion in Pakistan over the period 1974-02. Estimating the currency demand equation to construct the size of the underground economy and tax evasion, the results demonstrated that the underground economy has increased enormously from Rs 12 billion in 1974 to Rs 1085 billion in 2002.

Kemal (2003) used the same dependent variable as above while the explanatory variables were tax-GDP ratio, banking services, GDP growth rate and a dummy variable for the period 1990-02 to estimate the size of informal economy for Pakistan from 1973-02. He concluded that the informal economy increased from 20 percent in 1974 to 54 percent in 1998 and then declined to 37 percent in 2002.

Kemal (2007) revised the old attempt of Kemal (2003) and used the best fit monetary approach to estimate the underground economy and tax evasion for Pakistan for the period 1973–05. The updated estimations showed that the underground economy and tax evasion were increasing rapidly in the early 1980s and this rate accelerated in the

1990s. The rate of increase slowed down till 1999 and then followed an increasing trend till 2003. The underground economy ranges from 54.6 percent-62.8 percent of GDP in 2005 while the tax evasion ranges from 5.7 percent-6.5 percent of total GDP in 2005.

Ahmed and Hussain (2008) made a comprehensive exercise to obtain the latest estimates for the size of the informal economy in Pakistan for the period 1960-03 by taking into account the tax and tariff reforms of 1990s. Based on the methodology of Ahmed and Ahmed (1995) with slight modifications, they came up with the conclusion that the black economy has a declining trend as a percentage of GDP due to the tax reforms involving rationalisation of tax rates. Moreover, the inclusion of bearers bond in the model also increases the size of the black economy. The informal sector as a percentage of GDP remained at 2 percent during 1960s, 17 percent during 1970s, 15 percent during 1980s and 13 percent during 1990s. Similarly, the tax evasion as a percentage of GDP remained at 5 percent during 1960s, 19 percent during 1970s, 16 percent during 1980s, and 11 percent during 1990s and so on.

Finally, in a recent study by Arby, *et al.* (2010), the size of the informal economy in Pakistan is estimated by using modified monetary approach by employing auto-regressive distributed lagged (ARDL) model based approach, electricity consumption approach and multi-indicators and multi-causes (MIMIC) model approach for the period 1966-08. The modified monetary approach showed that the underground economy increased from less than 30 percent in 1960s to 33 percent in 1990s and then declined to 23 percent in 2000s. The electricity consumption approach showed that the informal economy increased from about 5 percent in 1970s to 29 percent in 1990s and then declined to 27 percent in 2000s. However, the MIMIC model showed that the informal economy was around 30 percent of the total GDP in Pakistan over the sample period. It also showed that business cycle in informal economy moved with the business cycle of the formal sector economy in Pakistan.

3. DATA AND METHODOLOGICAL SETUP

This section briefly outlines the empirical setup by illustrating data and various structural and statistical approaches to estimate the informal economy for Pakistan.

3.1. Data

To estimate the informal economy using various approaches, data over the annual frequencies from 1973-2010 is used on various economic, political, institutional and demographical variables. Details on the construction and the sources of the data set are provided in Table 1of the appendix.

3.2. Methodologies

In order to estimate the informal economy, we used various structural and statistical approaches. The list of approaches start from simple monetary approach as of Tanzi (1980), modified monetary approach using Dynamic Ordinary Least Square (DOLS) technique of cointegration, structural estimation approach using multi-indicators multi-causes (MIMIC), electricity consumption approach (EC) and labour market approach using statistical accounting. The next subsections consist of descriptions on each methodology in detail.

3.2.1. *Simple Monetary Approach*

This section provides a simple monetary approach consistent to the seminal attempts of Tanzi (1980) for estimating the informal economy of Pakistan. Following this approach, it is a need to get estimates of the following regression:

$$CFM2 = \beta_0 + \beta_1 TY_t + \beta_2 POP_t + \beta_3 INF_t + \beta_4 CFM2_{t-1} + \beta_5 DD_t + \beta_6 BS_t + \beta_7 Y_t + \beta_8 R_t + \varepsilon_t$$

Where,

- CFM2 = ratio of currency in circulation and resident foreign currency accounts to money supply
- TY = ratio of overall tax to GDP
- POP = overall population
- INF = rate of inflation
- CFM2 (–1) = lagged variable used for the ratio of currency in circulation and resident foreign currency accounts to money supply
- DD = dummy variable taking the value of 1 from 1991-2009 (to capture the impact of foreign currency accounts after 1990)
- BS = total number of bank deposits / total number of bank accounts
- Y = real growth of GDP
- *R* = weighted average rate of return on deposits.

For each year, the final predicted value of ratio of currency in circulation and resident foreign currency accounts to money supply is computed by subtracting the regressed values of ratio of currency in circulation and resident foreign currency accounts to money supply without including the tax variable $(CFM2)_{wt}$ from the regressed values of ratio of currency in circulation and resident foreign currency accounts to money supply including the tax variable $(CFM2)_t$ in the regression equations. After subtraction, the final predicted value of ratio of currency in circulation and resident foreign currency accounts to money supply is equal to the coefficient of total tax to GDP ratio times the actual value of total tax to GDP ratio for each year as shown below;

$$(CFM2)_t = \beta_0 + \beta_1 TY_t + \beta_2 POP_t + \beta_3 INF_t + \beta_4 CFM2_{t-1} + \beta_5 DD_t + \beta_6 BS_t + \beta_7 Y_t + \beta_8 R_t$$

$$(CFM2)_{wt} = \beta_0 + \beta_2 POP_t + \beta_3 INF_t + \beta_4 CFM2_{t-1} + \beta_5 DD_t + \beta_6 BS_t + \beta_7 Y_t + \beta_8 R_t$$

$$CFM2_t = (CFM2)_t - (CFM2)_{wt} = [\beta_0 + \beta_1 TY_t + \beta_2 POP_t + \beta_3 INF_t + \beta_4 CFM2_{t-1} + \beta_5 DD_t + \beta_6 BS_t + \beta_7 Y_t + \beta_8 R_t] - [\beta_0 + \beta_2 POP_t + \beta_3 INF_t + \beta_4 CFM2_{t-1} + \beta_5 DD_t + \beta_6 BS_t + \beta_7 Y_t + \beta_8 R_t]$$

$$CFM2_t = (CFM2)_t - (CFM2)_{wt} = \beta_0 + \beta_1 TY_t + \beta_2 POP_t + \beta_3 INF_t + \beta_4 CFM2_{t-1} + \beta_5 DD_t + \beta_6 BS_t + \beta_7 Y_t + \beta_8 R_t - \beta_0 - \beta_2 POP_t - \beta_3 INF_t - \beta_4 CFM2_{t-1} - \beta_5 DD_t - \beta_6 BS_t - \beta_7 Y_t - \beta_8 R_t$$

The solution to above yields: $CFM2_t = \beta_1 TY_t$. The final predicted value of ratio of currency in circulation and resident foreign currency accounts to money supply is divided by 100 so as to remove the percentage. From here, this estimated series CFM2 is

multiplied with M2 to get the illegal money. In order to calculate legal money in the economy, the series of illegal money is subtracted from the series of M2 for each year. Moving ahead, velocity of money in the underground economy is estimated by dividing the total GDP with legal money. Assuming that the velocity of money is same for both legal and illegal money in the economy, the final estimations for the underground economy is obtained by multiplying the illegal money with the velocity of money for each respective year.

Tax evasion for each year is calculated by multiplying the underground economy with total tax to GDP ratio.

- Illegal money (IM) = CFM2 * M2
- Legal money (LM) = M2-IM
- Velocity (V) = GDP / LM
- Informal Economy (IE)= IM * V
- Tax Evasion (TE) = IE * (total taxes / GDP)
- IE as % of GDP = (IE / GDP) * 100
- TE as % of GDP = (TE / GDP) *100

According to Tanzi (1980), the final estimates from the monetary approach computing the size of the underground economy for any country should not be considered as precise estimates, because they are sensitive to assumptions rather, it would be highly expedient to consider them as broad indicators of a fluctuating trend over the period of analysis.

3.2.2. *Modified Monetary Approach using Dynamic OLS*

The most recent study in the case of Pakistan by Arby, *et al.* (2010) defined a new approach named modified version of the monetary approach using Autoregressive Distributed Lag[5] (ARDL) model. According to authors, it is their seminal attempt to use ARDL modelling approach to estimate the informal economy in case of Pakistan. Further, this approach overcomes the problem associated with the estimation of informal economy through simple monetary approach of Tanzi (1980) as the results of simple monetary approach may be spurious. Since, the ARDL modelling approach allows using different order of integration series, while computing long-run estimates; this approach is also capable to handle the problem of endogeneity thus providing unbiased cointegrated estimates. Using the ARDL approach, the authors succeeded in establishing a long run dynamic relationship between the currency ratio and other associated variables. Then, they used the long-run cointegrated estimates to compute informal economy for Pakistan.

The cointegration literature of time series econometrics has another credible approach named Dynamic Ordinary Least Square (DOLS) developed by Stock and Watson (1993). This method is also useful for the investigation of long run relationships among dependent and explanatory variables. The estimation procedure works by estimating the dependent variable on constant plus explanatory variables on level form and leads and lags at the first differences. This method is superior to a number of other estimators as it can be applied to system of variables with different orders of integration;

[5]This Co-integration approach is suggested by Pesaran and Shin (1999) and Pesaran, *et al.* (2001).

see for example, Stock and Watson (1993). This methodology is a substitute of ARDL approach cointegration as the inclusion of leads and lags of the differenced explanatory variable corrects for simultaneity, endogeneity, serial correlation and small sample bias among the explanatory variables see, Stock and Watson (1993).

We follow Arby, *et al.* (2010) specifications to modify Tanzi's (1983) monetary approach of estimating the informal economy. The model specification assumes the (CM) currency to M2 ratio as a dependent variable and (T) tax burden proxies by tax to GDP ratio, a proxy for financial sector development, market interest rate as a proxy of monetary policy, and literacy rate as a proxy of human capital as key determinants. The informal economy's computational procedure is based on DOLS estimation procedure rather than ARDL. Thus, it enables us to use an alternative estimation mechanism and get reliable estimates.

$$CM_t = \varphi_0 + \varphi_1 T_t + \varphi_2 F_t + \varphi_3 R_t + \varphi_4 H_t + \sum_{i=-p}^{r} \theta_{1t} T_{t-i}$$

$$\sum_{i=-p}^{r} \theta_{2t} FT_{t-i} + \sum_{i=-p}^{r} \theta_{1t} R_{t-i} + \sum_{i=-p}^{r} \theta_{1t} H_{t-i} + \zeta_t$$

The usual long-run restriction is tested by Wald-Coefficient restriction tests as specified by Stock and Watson (1993). Once the cointegration hypothesis is accepted, it is assumed that there exists a long-run relationship between the specified set of variables. The long-run model can be re-written from the above DOLS specifications as:

$$CM_t = \hat{\varphi}_0 + \hat{\varphi}_1 T_t + \hat{\varphi}_2 F_t + \hat{\varphi}_3 R_t + \hat{\varphi}_4 H_t$$

It is important to note that there is no need of normalisation as DOLS provide direct estimates. Given these estimates, one can easily compute informal economy as percentage of formal economy (GDP):

$$Ratio(IF/F)_t = \frac{\hat{\varphi}_1 T_t + \hat{\varphi}_4 E_t}{m_t}$$

Where, *IF* is GDP of informal economy; *F* is the GDP of formal economy and m_t is the ratio of near money to broad money, respectively.

3.2.3. *Structural Approach Using Multi-Indicators and Multi-Causes (MIMIC)*

This section formally layouts a modern structural approach named Multi-Indicators and Multi-Causes (MIMIC) approach. It represents a statistical vis-à-vis economic relationship among latent (hidden or unobserved) and manifest (observed) variables. The special structural form assumes linear independent structural relationship (also called as LISREL) among unobserved and manifest variables. In an earlier attempt, Bollen (1989) presents the fundamental hypothesis for structural equation modelling as: $CS = \Omega(\Theta)$, where Ω is the observed population covariance matrix, Θ is a vector of model parameters, and *CS* is the covariance matrix implied by the model. When the equality expressed in the equation holds, the model is said to "fit" the data. Thus, the objective of this modelling approach is to explain the patterns of covariance observed among the latent and observed variables. A special version of this modelling approach is

the Multi-Indicators and Multi-Causes approach. On one hand, it allows to consider the structural equation as a "latent or hidden" variable linked to a number of observable indicators and on the other hand to a set of observed causal variables, which are regarded as some of the most important determinants of the unreported economic activity see for example, Schneider, Büehn and Montenegro (2010).

The MIMIC model is build upon two sorts of equations; the structural one and the measurement equations system. The equation that captures the relationship among the latent variable (IE) and the causes (*X*) is named as "structural model" and the equation that links the indicators (Z) with the latent variable (non-observed economy) is called as "measurement model".

According to Schneider, Büehn and Montenegro (2010), MIMIC model of the informal economy is expressed as:

$$IE = \gamma' X + \upsilon$$
$$Z = \lambda IE + \varepsilon$$

Where, *IE* is the scalar latent or hidden variable (the size of informal economy in our case), $Z = (Z_1, \ldots Z_p)$ is the $(1 \times p)$ vector of indicators of the *IE* variable, $X' = (X_1, \ldots X_q)$ is the $(1 \times q)$ vector of causes of *IE*, $\lambda_{(p \times 1)}$ and $\gamma_{(q \times 1)}$ are the vectors of parameters and $\varepsilon_{(p \times 1)}$ and $\upsilon_{(q \times 1)}$ are the vectors of scalar random errors. The ε and υ are assumed to be mutually uncorrelated: ($E(\varepsilon_t \upsilon_t') = E(\upsilon_t \varepsilon_t') = 0$.

The MIMIC model assumes that the variables are measured as deviations from their means and that the error term does not correlate to the causes: $E(\eta_t) = E(x_t) = E(\xi_t) = 0$ and $E(x_t \xi_t') = E(\xi_t x_t') = 0$. The variance of υ is abbreviated by Ψ and Φ is the $(q \times q)$. covariance matrix of the causes x_t. The measurement model $Z = \lambda IE + \varepsilon$ represents the link between the latent variable and its indicators; the latent unobservable variable is expressed in terms of observable variables. Their $(p \times p)$ covariance matrix is given by Θ_ε . Like the MIMIC model's causes, the indicators are directly measurable and expressed as deviations from their means: $E(Z_t) = E(\varepsilon_t) = 0.$ It is assumed that the error terms in the measurement model do not correlate either to the causes x_t or to the latent variable IE_t . $E(x_t \varepsilon_t') = E(\varepsilon_t x_t') = 0$ and $E(IE_t \varepsilon_t') = E(\varepsilon_t IE_t') = 0.$

The reduced form of the structural equations can be written as: $Z = \Pi X + u$, where $\Pi = \lambda \gamma'$, $u = \lambda \omega + \varepsilon$. The error term *u* is a (p ×1) vector of linear combinations of the white noise error terms υ and $\mathcal{E}$ from the structural equation and the measurement model: $u \approx (0, \Gamma)$. The covariance matrix Γ is given as: $\text{cov}(u) = \lambda \lambda' \psi + \Theta_\varepsilon$, $\text{cov}(\upsilon, \upsilon) = \psi$, $\text{cov}(\varepsilon, \varepsilon) = \Theta_\varepsilon$ the diagonal covariance matrix of ε.

For identification of MIMIC model, some conditions are available but none of them are necessary and/or sufficient conditions as shown by Bollen (1989). The necessary (but not sufficient) condition so-called the *t-rule*, enunciates that the number of non-redundant elements in the covariance matrix of the observed variables must be greater or equal to the number of unknown parameters in the model-implied covariance

matrix, see for example, Bollen (1989). On the other hand, a sufficient (but not necessary) condition of identification is that the number of indicators is two or greater and the number of causes is one or more, provided that is assigned a scale to *IE* (MIMIC rule). For assigning a scale to the latent variable, it is needed to fix one λ parameter to an exogenous value. Although several econometric improvements are introduced in the last years, the most important criticism to the MIMIC method is the strong dependence of the outcomes by the (exogenous) choice of the coefficient of scale (λ).

Given an estimate of the γ vector and setting the error term υ to its mean value of zero, enable us to "predict" *ordinal* value for *IE* which is the relative size of the informal economy at each sample point. Then, if we have a specific value for *IE* at some sample point, obtained from some other source, we can convert the within-sample predictions for *IE* into a *cardinal* series. We use an average value from other estimations realised using the model specifications to calibrate the time-series of the informal economy.

Arby, *et al.* (2010) study was the first attempt to "calibrate" such MIMIC model informal economy results formally in the context of Pakistani data.

3.2.4. *Electricity Consumption Approach*

The electricity consumption approach looks at physical indicators, particularly electricity usage, to estimate the size of the informal economy. For the first time, Kaufmann and Kaliberda (1996) used this approach at the National Accounts level to estimate the informal economies of post-socialist countries. According to the authors, electricity consumption is the best proxy of overall economic activity both in terms of formal and informal economies. Various empirical studies find that elasticity of electricity consumption to official GDP is approximately closed to one, see for instance, Dobozi and Pohl (1995) and Johnson, Kaufmann, and Shleifer (1997). From the National Income Accounts, the amount of electricity needed to produce the official GDP is subtracted from total electrical output. If there is some excess then it is considered as informal economy. For our study we take the ratio of growth of total electricity consumption and official GDP (data taken from the Economic Survey of Pakistan), with deviations from expected levels subsequently used as proxies of informal economic activity.

3.2.5. *Labour Market Approach*

The labour market approach as discussed in economic literature is used not only to estimate the size of the informal economy but it also renders an insight of the causes and implications of informal economy in terms of employment generation and increasing or decreasing inequality in income levels in both high growth period and slow growth period. This approach also helps to understand the trend of migration of people from formal to informal sector and vice versa which gives a key policy implication for sustainability as well as productivity of employment generation in the sector, see for instance, Gennari (2004). It also helps in demarcating between formal and informal sectors and their relationship between themselves.[6]

[6]Ghayur (1994) study highlights the importance of labour market information system for informal sector in the case of Pakistan.

For the purpose of analysis, the overall economy is disaggregated into two main sectors namely; agriculture sector and non-agriculture sector. Minimalism of the non-agriculture sector into formal and informal sectors has lead to a step ahead, where these two sectors are further divided into their respective sub-sectors on the basis of reviewed literature.

The formal analysis is based on various hypotheses. Keeping in view the different results of various studies, we test the following two kinds of hypotheses. First denotes main hypotheses based on stylised facts of various studies and second denotes related hypotheses subject to various conditions.

Main Hypotheses: (Behaviour of employment and income per capita growth rates in formal and informal sectors during fast and slow growth periods)

- The growth of employment in the formal sector (e_{f2}) is lower than the growth of employment in the informal sector (e_{i2}) during slow growth of the economy.
- Mathematically; $e_{f2} < e_{i2}$
- The growth of real income per worker in the formal sector (Y_{f2}) during a slow growth period is lower than the growth of real income per worker in the formal sector (Y_{f1}) during the fast growth period.
- Mathematically; $Y_{f2} < Y_{f1}$
- The overall productivity in the informal sector during slow growth of the economy is less than zero.
- Mathematically; $Y_{i2} - e_{i2} < 0$

Related Hypotheses:

- When the growth of real income per worker in the total non-agricultural sector during a fast growth period (Y_1) is greater than the growth of real income per worker in the total non-agricultural sector during a slow growth period (Y_2), i.e.,
- Mathematically; $Y_1 > Y_2$
- The growth of employment in the formal sector (e_{f1}) is greater than the growth of employment in the informal sector (e_{i1}) during a fast growth period.
- Mathematically; $e_{f1} > e_{i1}$
- The growth of employment in the formal sector (e_{f2}) is less than the growth of employment in the informal sector (e_{i2}) during a slow growth period.
- Mathematically; $e_{f2} < e_{i2}$
- The growth of real income per worker in the formal sector (Y_{f1}) is greater than the growth of real income per worker in the informal sector (Y_{i1}) during a fast growth period.
- Mathematically; $Y_{f1} > Y_{i1}$
- The growth of real income per worker in the formal sector (Y_{f2}) is less than the growth of real income per worker in the informal sector (Y_{i2}) during a slow growth period.
- Mathematically; $Y_{f2} < Y_{i2}$

In order to test various hypotheses regarding formal and informal sectors, secondary annual data for the period 2002-09 has been taken for the purpose of a time

series analysis. The data on percentage share of employed labour force above 10 years of age has been taken from various issues of labour force survey (LFS) for the fiscal years 2001-02, 2003-04, 2005-06, 2006-07, 2007-08 and 2008-09. The data on average monthly income has been taken from various issues of household integrated economic surveys (HIES) for the fiscal years 2001-02, 2004-05, 2005-06 and 2007-08. Additionally, steps involved in calculating the informal sector as percentage of overall GDP through labour market approach are as follow:

For Unpaid Family Workers

Data for total employed civilian labour force (10–14 year bracket) and female employed civilian labour force (10–14 year bracket) is taken from various issues of the Labour-Force Survey. Next, total employed labour force (millions) is multiplied with the above mentioned employed civilian labour force (total and female) which is then subtracted from total employed labour force to get the rest of the labour force employed in all age limits. Moving ahead, data for unpaid family workers for both sexes and female is obtained from various issues of Labour-Force Survey which is divided by 100 to remove the percentage. Estimates for the unpaid family workers in the informal sector are acquired by multiplying the remaining employed labour force employed in all age limits with the data on unpaid family workers for both sexes and female (after dividing by 100) for each year. However, the number of unpaid family workers in the formal sector is calculated by subtracting the estimated number of unpaid family workers in the informal sector from the total unpaid family workers for both sexes and female. Next, the estimated number of unpaid family workers in each respective year in the informal sector is added to the number of workers lying in the age bracket of 10–14 years.

Total per-capita income is further calculated by dividing the total GDP with total labour force employed for each year. In order to get the per-capita income of unpaid family workers in the informal sector, total per-capita income is multiplied with the sum of estimated number of unpaid family workers in each respective year in the informal sector and number of workers lying in the age bracket of 10–14 years. Lastly, the informal sector as percentage of overall GDP is estimated by dividing the per-capita income of the informal economy with total GDP and multiplying this fraction with 100 as given in Table 2D.

For Self-employed Labour Force

Similar estimations as above are done through the labour market approach by incorporating the self-employed labour force into the pool of informal economy.

Another estimate through Labour Market Approach is done with the addition of self employed labour force into the pool of informal economy.

4. RESULTS AND DISCUSSION

The main focus of this section is to provide comprehensive interpretations about the size of the informal economy obtained from various methodologies. Furthermore, it also our objective to highlight the significant factors which cause the informal economy in case of Pakistan.

In our first attempt we estimated the size of the informal economy of Pakistan using basic monetary approach. The monetary regression is estimated using ordinary least squares procedure by utilising data from 1982–2010. The results are reported in Table 3 of the appendix. One can easily draw conclusion from the results that all financial and monetary variables are significant *vis-à-vis* tax burden plays a dominant role. The informal economy (as percent of GDP) obtained from this approach is also plotted in Figure A1. It shows that the ratio increased in mid 90's and then slowed down in the autocratic regime. The figures of informal economy in mid 2000's show an increasing trend, but then there is some downward trend for the past two years. The size of informal economy as percent of GDP remains from 32 percent-38 percent. The estimated tax evasion results are also plotted in Figure A2. It shows that tax evasion (as percent of GDP) remains from 3 percent–4 percent with small cyclical fluctuations over the sample period.

The results of modified monetary approach using DOLS model are reported in Table 4 of the appendix. The DOLS model is initially estimated for setting $i = 1$ to 4 leads and lags. After using Akaike information criterion we restrict our model by inclusion of one lead and lag variable. The DOLS model is then estimated using maximum likelihood procedure. Using Stock and Watson (1993) specifications, we test the cointegration among selected variables by imposing Wald restriction test. The restriction results finally enable us to accept the hypothesis that all variables are cointegrated. Using the long run estimates obtained from ML procedure, we computed informal economy (as percent of GDP) and reported our annual estimates from 1973–2010 in the Table 7 of appendix. The annual estimates show that the informal economy has increased initially and then there is a consistent declining trend over time, but the pace of this decline is quite slow. On an average, in the few years the informal economy (as percent of GDP) remained at 20 percent–22 percent.

In our third attempt, we have estimated the size of the informal economy using MIMIC model. Arby, *et al.* (2010) only considered one specification of informal economy in case of Pakistan. But in our study, we have considered three specifications of MIMIC model by utilising various economic and institutional variables. The results of all three specifications are given in Table 5 and in subsequent Figure A3 of appendix. It is interesting to note that while incorporating corruption and size of government indicators in one specification as given in model-C, the estimated ratio of informal economy to formal remains at 50 percent–60 percent, which is quite high. However, other specifications which consider economic of freedom and other economic stability variables also show quite reasonable estimates. We apply simple average procedure by taking mean of all three specifications to overcome *biasness.* The average estimates are then reported in Table 7. Our average estimates are very close to Arby, *et al.* (2010) single specification of MIMIC model results. We also compare our estimated results with the results available in a recent study by Schneider, Büehn and Montenegro (2010) for Pakistan. Our MIMIC model results of all three specifications are closed to Arby, *et al.* (2010) but less then (in terms of size) the results of Schneider, Büehn and Montenegro (2010). Finally, our average results show that the size of the informal economy (as percent of GDP) remains around 28 percent over the sample period.

These results also show that tax burden, unemployment rate, economics of freedom, corruption, government size, openness and inflation are significant determinants and play a dominant role in expansion/contraction of the informal economy in Pakistan.

In our fourth attempt, we have estimated the size of the informal economy using the physical indicator approach, namely; the electricity consumption approach. The results of this approach are reported in Table 7 of the appendix. The results of the informal economy (as percent of GDP) remained at 40 percent-50 percent. These estimates may not be reliable as they over-estimate the informal economy. As Arby, *et al*. (2010) noted, this approach do not incorporate self-generation of electricity by economic agents which boomed in mid 90s due to crisis in official sector of power generation and distribution in Pakistan.

In our final attempt, we have used labour market approach to estimate the size of informal economy from 2000–10. The results of this approach are reported in Table 7 of the appendix. This approach is based on unpaid family workers as well as self-paid family workers where the labour force between 10-14 years is also included in the labour force pool of the informal economy. Published data for 10 years has been used which is obtained from the Labour-Force Survey and the Household Integrated Economic Survey. The estimated results based on unpaid family workers are consistent with our MIMIC average estimates of three specifications while the estimates which include self-paid family workers are also consistent with the estimates of electricity consumption method. It explains the hidden characteristics of the economy that the cottage industry, Small-Scale and Manufacturing industries (generally not registered) cannot be captured by the simple monetary and simple labour approach but the demand for the electricity to run the factories can be captured by the electricity consumption approach.

The labour market approach facilitates us to test the hypotheses that whether or not the informal economy is a cushion against poverty and income inequality. It also helps to understand the behavioural pattern of growth of informal, formal and overall economy and its inter linkages vis-à-vis spillover effects. In order to test these hypotheses, the percentage share of employed labour force and deflated yearly average incomes in non-agricultural, formal and informal sectors are divided into the above mentioned growth periods (See, Tables 15A and 15B). The results of the annual cumulative growth rates are given below. The results explain that during slow growth of the economy, the growth of employment in the formal sector (e_{f2}) is lower than the growth of employment in the informal sector (e_{i2}). Moreover, the growth of real income per worker in the formal sector during a slow growth period (Y_{f2}) is lower than the growth of real income per worker in the formal sector during the fast growth period (Y_{f1}). Moreover, the overall productivity in the informal sector (Y_{i2}–e_{i2}) during slow growth of the economy is less than zero. It further substantiates that when the growth of real income per worker in the total non-agricultural sector during a fast growth period (Y_1) is greater than the growth of real income per worker in the total non-agricultural sector during a slow growth period (Y_2). The growth of employment in the formal sector (e_{f1}) is less than the growth of employment in the informal sector (e_{i1}) during a fast growth period. The growth of real income per worker in the formal sector (Y_{f1}) is less than the growth of real income per worker in the informal sector (Y_{i1}) during a fast growth period. The growth of employment in the formal sector (e_{f2}) is less than the growth of employment in the

informal sector (e_{i2}) during a slow growth period. The growth of real income per worker in the formal sector (Y_{f2}) is less than the growth of real income per worker in the informal sector (Y_{i2}) during a slow growth period.

EMPLOYMENT

	Annual Cumulative Growth Rate (ACGR)	
	Fast Growth Period (2001-02 to 2006-07)	Slow Growth Period (2007-08 to 2008-09)
Non-Agriculture	e_1	e_2
	–0.53	–0.78
Formal Sector	e_{f1}	e_{f2}
	–5.03	–2.59
Informal Sector	e_{i1}	e_{i2}
	1.63	–0.1

INCOME

	Annual Cumulative Growth Rate (ACGR)	
	Fast Growth Period (2001-02 to 2006-07)	Slow Growth Period (2007-08 to 2008-09)
Non- Agriculture	Y_1	Y_2
	3.58	–5.44
Formal Sector	Y_{f1}	Y_{f2}
	0.55	–7.89
Informal Sector	Y_{i1}	Y_{i2}
	8.44	–2.18

Over the period of analysis, on average, the fluctuation in employment share in non-agriculture of 2.88 from the mean value of 24.10 million is mainly caused by the informal sector. The fluctuation in the employment share of informal sector is 2.43 million from the mean value of 17.11 million which is much larger than that of 0.77 million from the mean value of 7.00 million (See, Table 11A). The estimated average yearly income in formal sector results in less fluctuations than average yearly income in the non-agriculture sector by Rs 14413.68 from the mean value of Rs 58585.52. Two sub-sectors namely; mining and quarrying and electricity, gas and water, are mainly responsible for fluctuations in the average yearly income in the formal sector. The estimated average yearly income in mining and quarrying is the highest among all sub-sectors in the formal sector while, the average yearly income in electricity, gas and water is the lowest. The increase in average yearly income in mining and quarrying can be attributed to large amounts of investment in the sector on yearly basis from 2006-2009. The lowest mean of average yearly incomes in electricity, gas and water was due to the sharp decline in incomes over the period 2004-5–2005-6 which was caused due to a sharp decline in the rate of investments in the preceding years.

Over the period of analysis, there was a fluctuation in the average yearly income in the informal sector. On average, the average yearly income in the informal sector fluctuates more than the fluctuations of average yearly income in non-agriculture sector

(formal and informal sector) by Rs 16037.65 from the mean value of Rs 40992.54, where the maximum value is Rs 66859.44, minimum value is Rs 18827.09 and the range is Rs 48032.35. Two sub-sectors namely; wholesale and retail trade and transport and communication are mainly responsible for the fluctuations in yearly average income in informal sector. Over the period of analysis, the average yearly income in wholesale and retail trade was estimated to be the highest among all sub sectors due to an unprecedented increase in investment leading to an increase in average yearly income from 2005-6–2006-7 while, average yearly income in transport and communication was the lowest. This is due to the fact that in the informal sector, the average yearly income of base year in transport and communication was much lower than the yearly average incomes of other sub-sectors. (See, Table 11B).

Over the range of analysis where the growth rate of the real GDP is above 5 percent, the growth rate of employed labour force in the formal sector remains constant while that of the informal sector sharply decreases. It can be concluded that the growth of real GDP in Pakistan is consumption led growth and not an employment led growth. Moreover, it also justifies the point that inequality increases with high rates of growth of real GDP in Pakistan. There exists a negative relationship between growth rates of real GDP and growth rates of average yearly income in the informal sector. (See, Figures A5, A6). On the basis of actual estimated values, the hypothesis is true that growth of real GDP results in relatively higher increase in growth rate of average yearly income in the formal sector and vice versa. Moreover, an increase in the growth rate of real GDP results in a relatively larger decline in the growth rate of average yearly income of the informal sector. Simultaneously, on the basis of trend line, there is an inverse relationship between growth rate of real GDP and growth rate of average yearly income in formal and informal sectors (particularly, over the range where GDP is above 5 percent), See Tables 9 and 10.

5. CAUSES AND IMPLICATIONS OF INFORMAL ECONOMY

The focus of this section is to provide an insight of the causes and implications of the hidden economy and likely consequences on the macroeconomic variables.

5.1. Causes of Informal Economy

On the basis of our analysis and reviewed literature, the main causes/factors of informal economy include; cultural constraints, high ratio of per-capita income and highest currency denomination note, low literacy rate, high cost of doing business, devaluation of currency, transfer of money through hundi, low growth rate of public sector development expenditures in the right direction and current structure of financial system both in terms of growth and service delivery. Factors which may add to the potential expansion of the informal economy in future include; recent destruction of water bomb (see, Table 18), imposition of new GST/VAT system, decreasing rate of general purchasing power, increasing rate of cross border smuggling, price hike of electricity and petroleum goods and weak law enforcement and increasing corruption.

High denomination currency notes are considered as one of the major causes of the existence and expansion of the informal economy in Pakistan. On average, the per-capita per month money holding is less than Pak Rs 4000 which is the maximum purchasing power at any day in a month. However, it is significantly less than the high denomination

currency note i.e., Rs 5000. This simple fact explains that Rs 5000 is not used for general transactions in the formal sector. It leads to the fact that the demand for Rs 5000 note may be attributed to its use for non-productive bustles as well as illegal activities such as hoarding, theft, currency scam (as occurred in past few years), illegal transfer of money and contributes significantly to the size of the informal economy. Second indicator explaining the same fact is that the ratio of per-capita income and highest denomination currency note of Pakistan is extremely low relative to that of developed and developing countries (See, Tables 2A, 2B, 2C).

Corruption, inflation and tax evasion are not only causing an expansion in the size of the informal economy (See, Tables 3, 4, 5) but also hampering the growth rate of informal economy, thereby adding more to economic uncertainty, income inequality and poverty.

According to our estimates, the informal economy constitutes about 30 percent to 35 percent of the total economy over the period of analysis. As per the design of the New Tax system and the current economic structure of the country, VAT can only be imposed on the formal sector of the economy. It can lead to a diversion in the resources as well as generation of wealth from formal sector to informal sector, thereby causing the expansion of the informal sector at the expense of the formal sector. Therefore, it will give an impetus to the growth of tax evasion thus leaving the growth of taxes constant even during the fast growth periods in future as happened in the previous years (See, Table 16). In the wake of the recent destruction by water bomb if copped with the current status quo, then it will again lead to the expansion of the informal economy which further adds more to the conventional characteristic of the national economy. The social and cultural constraints (including rural life and conventional mentality as major issues) pose a great difficulty to convert the informal economy into formal economy where illiteracy adds more to it.

5.2. Issues/Implications of the Informal Economy

The most important implications that emerged from our empirical analyses are enlisted below.

5.2.1. *Role of Informal Economy on Poverty Alleviation and Socio-Economic Stability*

The role of the informal economy is ambiguous in terms of alleviating poverty. It generates low salary jobs which have an uncertain impact on the severity of poverty subject to inflation. During high inflationary period, it is unable to stop the brutality of poverty. As shown in the above analysis, it contributes towards the income inequality in real terms through two ways; first, by keeping incomes low, second; by stimulating inflation. It is also evident from the above analysis that there are stability issues in the employment and income generation as large fluctuations have been found in the informal sector which gives an uncertain aspect to the economic conditions and discourages the investment.

Cheema, *et al.* (2008) explains that Northern Punjab is at the bottom of the ladder of poverty followed by Central Punjab, West Punjab and Southern Punjab. The ranking of these four regions of Punjab on the basis of informal economy is the same as on the

basis of poverty. It manifests the strong positive relationship between the existence of poverty and informal economy. The informal economy causes high inflation rate which results in declining the living standards as the growth of income in this sector is less than that of inflation rate as shown in the following table. The indices values of Food & Beverages and Wheat are the highest in the most backward region of the country where the informal economy dominates. In this way, the existence of informal economy shows the conventional and backward characteristic of the overall economy and contributes towards the divergence within the country as concluded by Ahmad and Ahmed (2008) on the basis of intercity variation in prices.

The social implications of the existence and growth of the informal economy especially during stagflation is swear as the employed labour force start shifting from legal to illegal activities so that they can meet their constant consumption. The unemployed labour force provide ready recruit in the ranks of terrorists and dacoits' etc. It is evident from the fact that the increasing rate of terrorist attacks, theft of national income and resources, surmounting corruption and increasing rate of smuggling are primarily originating from the areas where informal economy dominates the formal economy.

Province/Capital	Food and Beverages Index	Wheat Index
Punjab	99.23	97.15
Sindh	102.30	101.57
NWFP	100.82	109.30
Balochistan	108.35	109.85
Islamabad	110.59	99.00

Source: Ahmed and Gulzar (2008).

5.2.2. *Acts as a Constraint against an Effective Public Policy Implementation*

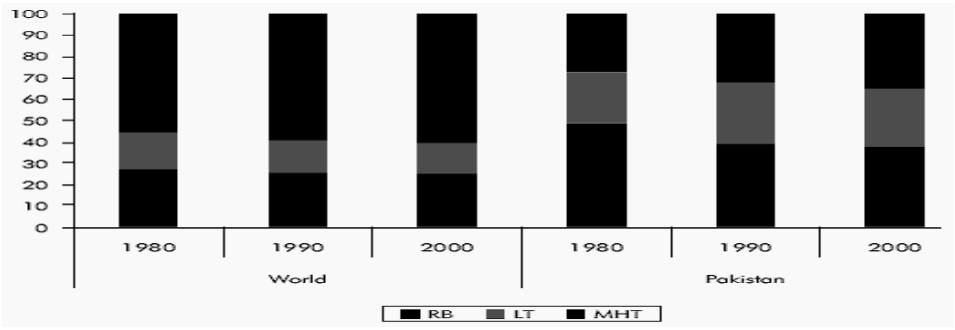
Significant size of the informal economy will restrict the effectiveness of VAT in order to increase the tax to GDP ratio. The basic constraint on the successful implementation of VAT lies in the fact that all the financial transactions will be made through banks. However, the significant size of the informal economy and biased growth of the financial sector (growth of financial sector has been less than the requirement in rural area) under lock almost 50 percent of the effectiveness of VAT before hand, as one of the basic characteristics of informal economy is that the transactions are made in cash and through barter system in it. It also limits the success of the tight monetary policy during inflation as high interest rates do not attract the poor/low salary people to save more because of their high marginal propensity to consume as determined by Kuznets.

As explained above, the estimation of the informal economy also explains the fact that historically, the informal economy caused low tax to GDP ratio by three ways; first; informal economy contributes nothing to the Tax toll and all the tax collections are made from the formal sector, second; it also provides the cushion to evade taxes in the formal sector which amounts to about 3 percent of the total GDP as explained above, third; it hampers the growth of formal sector as the share of informal economy to the overall economy did not decrease significantly over the period of analysis as shown in the Table 7 of the appendix.

5.2.3. *Implications of the Informal Economy in Context of Globalisation and Free Markets*

In the context of globalisation and free markets, the informal economy is greatly responsible for less value addition in the goods sold in the international market as well as equally responsible for restraining the potential of the country to produce high value added products by restraining the shift of technology even in formal sector through its backward and forward linkages with it. Consequently, the technological shift in manufacturing sector (i.e., formal sector) is relatively lower than that of Pakistan as shown below. It works in three ways; first; as it results in low savings and low capital formation, second; low resource constraint in formal sector, third; puts capacity constraint on labour force and restrain the labour force productivity through underemployment, disguised employment, providing low salary and early age employment (child labour).

Technological Shift in Manufacturing Sector



Source: UNDP, 2004.

5.2.4. *Implications of the Informal Economy in the Context of the 18th Amendment and the 7th NFC Award*

Under the 18th Amendment, the concurrent list has been abolished and all subjects have been delegated to the provinces thus putting a test of the provincial capacity to perform all the functions in the current state and also bring improvements in areas that are in line with the spirit of the 18th Amendment. However the pristine objectives of the 18th Amendment and the 7th NFC Award of strengthening the federation and empowering the provinces through fiscal decentralisation may be hampered by the existence of the informal economy, if the proper arrangements for the transformation of the informal economy into formal economy are not made. These arrangements include; starting of public sector development projects that can generate permanent businesses that are adaptable to change as well as business community in the areas of informal economy in order to guarantee permanent and high paid jobs. If the meso policies of the federal and provincial governments remain, then not only the benefits of the two historic breakthroughs may not be reaped as such policies provide stimulus to the existence and growth of informal economy but these may have adverse impacts on the overall economy through increasing income inequality and poverty among provinces which is ever dangerous for an overall national character of the federation.

6. CONCLUSION

The use of different approaches in this study provides more accurate and reliable estimates of the size of the informal economy. These estimates are consistent with other locally and internationally published studies on the same topic. These estimates will prove to be helpful for the policy makers to have a clear glimpse of the macroeconomic structure of the economy from a better position. These estimates also provide the basis for adjustment of the underestimated key macro economic variables which have direct implications at micro level. The difference among the estimates through different approaches enables us to analyse the behavioural as well as structural growth of the informal economy by capturing the impact of its legal and illegal parts, both separately and jointly.

On the basis of labour market approach and electricity consumption approach, the impact of cottage industry and small-scale manufacturing industries (generally not registered) on the growth of informal economy is highlighted. The labour market approach also helps conclude that the role of the informal economy is ambiguous in terms of alleviating poverty. During high inflationary period, it is unable to stop the severity of poverty. It also contributes towards income inequality in real terms through two ways; first; by keeping incomes low, second; stimulating inflation. High instability in the employment and income generation in the informal economy is found on the basis of our analysis.

Through MIMIC approach, corruption and size of the government turn out to be highly significant in explaining the size of the informal economy (as percent of GDP). Since the values are quite high for each year than average estimates obtained using other variables. This difference leaves room for further research to capture and analyse the full impact of corruption along with the size of the government on the growth of the informal economy.

On the basis of our analyses and reviewed literature, the main causes/factors of the informal economy include; cultural constraints, high ratio of per-capita income to the highest currency denomination note, low literacy rate, high cost of doing business, devaluation of currency, transfer of money through hundi, low growth rate of public sector development expenditures and their judicious use in the right direction and current structure of financial system both in terms of growth and service delivery. Factors which may add to the potential expansion of the informal economy in future include; recent destruction of water bomb, imposition of new GST/VAT system, decreasing rate of general purchasing power, increasing rate of cross border smuggling, price hike of electricity and petroleum goods, weak law enforcement and increasing corruption.

In our analysis above, certain implications of the informal economy in terms of achieving the goal of stable inclusive growth and development are identified and discussed. Informal economy plays an ambiguous role in poverty alleviation and income inequality. It restricts the effective public policy implementation through its operations. It is also responsible for keeping the country on one of the last positions in the competition under the age of globalisation and free markets.

Under the current system, the informal economy will pose a big constraint on the true implementation of the 7th NFC Award and the 18th Amendment in terms of reaping full benefits through their well defined objectives. To eliminate this constraint, there is a

pressing need of reviewing the criteria of evaluating the public sector development programs both at federal and provincial levels. The criteria must ascertain that the future development programs especially in the flood hit areas will create an opportunity for regular nature of business, where the ownership belongs to the residents and that the business further generates permanent types of jobs and competitive levels of income.

To achieve the objective of tax to GDP ratio up to 15 percent-20 percent, the implementation policy of new GST/VAT must incorporate the informal sector through its identification and its operations to collect the taxes to the potential level. In order to eliminate the capital constraints from cottage industry and SMEs, thus bringing them under the umbrella of formal sector, there is a need to revamp the criteria of financial system to extend the loans on the basis of shake-hand rather than on collateral basis. It will certainly lead to significant expansion in the tax net. There is an incessant need to review the education policy and its implementation which should guarantee providing professional as well as technical/vocational education to the needy people, so that they can work in the formal sector and contribute towards the tax toll after getting handsome wages. In order to contrive some of the illegal part of the informal economy, the high denomination currency notes may be reduced from a 5000 rupee note to its initial level of a1000 rupee note.

To achieve our national goal of inclusive growth and socio-economic development, the public policy may be devised with the sole objectives of increasing Tax to GDP ratio through expanding the tax base and plugging the tax leakages. The policy may also ensure a team of competent and honest people which may use those government funds in the most efficient and prudent manner to achieve the maximum social and economic welfare. These ultimate targets can be achieved through three intermediary targets: first, formalising the informal economy while retaining all its positive impacts and during this, searching for competent and honest people from the grass root levels; second, stopping the generation of informal income from within the formal sector; third, to stop the informal/improper implementation of rules and regulations within the formal sector. These three intermediary targets are explained further.

On the basis of the results and their analyses, it is evident that the informal sector is much faster in generating employment than that of formal sector. However, this employment is generally temporary or seasonal and low paid. So there is a need of policy intervention which assures retaining all the positive facts of the informal economy and in the next stage, it help in formalising it through institutionalising its backward and forward linkages with the formal sector on all spheres. Since, Pakistan is a multi-cultural land characterised by different geological features and geographical facts, so the policy intervention should be made according to the nature of the growth of informal economy in each district of Pakistan. For example, it is expected that the dominant factor of the informal economy in the bordering areas may be smuggling and in rural areas, dominant factors may be low capital, child labour, and exploitation of labour in those factories or companies working in informal sector. In formal sectors, the policy intervention may revise the regulatory framework with the objective of stopping the generation of informal income in terms of corruption, white-Collar Crime and unbridled powers with the higher hierarchy in formal sector. Third one is the proper implementation of rules and regulations within the formal sector. For example, NHA has benefited with the extra

amount of billions of rupees from the source of Toll Tax by privatising them through open bidding in a highly competitive and transparent manner. It explains the simple fact that earlier the implementation of regulations to collect toll tax was either naïve or insufficient to meet the on ground realities and requirements. The policy interventions only in formal sector in the above said two dimensions will enhance both efficiency as well as add significant percentage of the overall GDP to the Tax Toll.

The first step in devising such a public policy as explained above may be to conduct applied research to understand the characteristic nature of growth phenomenon of the informal economy and informal generation of wealth within the formal sector at disaggregated levels including socio-geographical locations and different administrative levels (i.e., federal, provincial, district levels etc) respectively.

The above discussion brings us to the conclusion that the public policy may be devised in a manner to focus on the economy at district level with the sole objectives of increasing maximum tax from that district and searching for a team of competent and honest people through achieving intermediary targets, thereby bringing each district to maximum self sufficiency level and put a positive competition among all districts of Pakistan in terms of socio-economic growth and welfare, which is the true essence of fiscal federalism and empowering the provinces in the perspective of two historic breakthroughs (i.e., 18th Amendment and 7th NFC Award) in the history of Pakistan.

APPENDIX

Table 1

Description of Variables

Sr. No.	Variable Name	Description	Source
1	CIC	Currency in Circulation: This variable is used in calculation of currency demand variable	SBP, Annual Report, Various Issues
2	TB	Tax Burden: It is computed as total taxes to GDP ratio	MOF, Pakistan Economic Survey, Various Issues
3	Y	Formal Sector GDP: Gross Domestic Product (market prices with base 1999-00)	MOF, Pakistan Economic Survey, Various Issues
4	R	Interest Rate: Weighted Average Lending Rate	SBP, Annual Report, Various Issues
5	DD	Demand Deposits: Non-interest bearing financial instruments (Banking Deposits)	SBP, Annual Report, Various Issue
6	BS	Banking Services: Total Deposits/Total number of Bank accounts	SBP, Annual Report, Various Issue
7	F	Financial Development: Broad Money to GDP Ratio	SBP, Annual Report, Various Issue
8	SOG	Size of Government: Proxies as a ratio of total expenditure to GDP ratio	MOF, Pakistan Economic Survey, Various Issues
9	INF	Inflation Rate: It is calculated as growth rate of Consumer Price index in percent	FBS, Pakistan
10	Openn	Openness: Proxies as total trade to GDP ratio	MOF, Pakistan Economic Survey, Various Issues
11	Elect. Consumption	Total Electricity Consumption	MOF, Pakistan Economic Survey, Various Issues
12	EOF	Economics of Freedom Index	Heritage Foundation*
13	Corrupt	Corruption Index	World Bank Indicators, WDI-CD Version 2010
14	H	Literacy Rate: A Proxy of Human Capital	World Bank Indicators, WDI-CD Version 2010
15	LF	Labour Force	MOF, Pakistan Economic Survey, Various Issues
16	UR	Unemployment Rate	MOF, Pakistan Economic Survey, Various Issues
17	POP	Total Population (Millions in Rupees)	MOF, Pakistan Economic Survey, Various Issues

Note: SBP: State Bank of Pakistan; MOF: Ministry of Finance; FBS: Federal Bureau of Statistics

*William Beach and T. Kane, (2008), "*Methodology; Measuring the 10 Economic Freedoms*", Index of Economic Freedom, Heritage Foundation.

Table 2A

Ratio of Per-Capita Income (in Local Currencies) with High Currency Denomination Note

Country	Per Capita Income (y)	High Currency Denomination (d)	Ratio (y/d)
US	47000 ($)	100	470
UK	2400 (GBP)	50	48
JAPAN	4000000 (Yen)	10000	400
BRAZIL	16000 (Real)	100	160
CHINA	22000 (CNY)	100	220
INDIA	47000 (IRs.)	1000	47
PAKISTAN	89994.65 (PRs).	5000	18

Source: Country Specific Central Banks.

Table 2B

Ratio of Per-Capita Income (in Pakistan Rupees) with High Currency Denomination Note

Country	Per Capita Income (y) (In Pak Rupees)	High Currency Denomination (d)	Ratio (y/d)
US	4043736.65	8603.70	469.99
UK	327681.79	6826.70	48
JAPAN	4206563.06	10516.41	399.99
BRAZIL	823975.53	5149.85	159.99
CHINA	284043.65	1291.11	219.99
INDIA	90965.75	1935.44	47
PAKISTAN	89994.65	5000	17.99

Source: Country Specific Central Banks.

Table 2C

Per-Capita Per Month Money Holding (Pak Rs.)

Per Year Per-Capita income	89994.65
Per-Capita per month average money holding	3749.777

Table 2D

Steps Involved In Calculating the Informal Sector as a Percentage of Overall GDP through Labour Market Approach for Unpaid Family Workers and Self-Employed Workers

- A = Take values for employed civilian labour force for total and female (10–14 year bracket)
- B= Divide values of employed civilian labour force with 100 (A/100)
- C = Take values of total employed labour force (in millions) for the years mentioned above
- D = Multiply total employed labour force with employed civilian labour force (C*B)
- Rest of the labour force employed in other age limits D'= C-D
- E = Collect the data for unpaid family workers for both sexes and female from labour force surveys
- F= Divide values of unpaid family workers with 100
- G= Unpaid family workers in informal sector = D'*F
- Unpaid family workers in formal sector = E-G
- H = Add the unpaid family workers in informal sector with the workers of 10–14 age bracket
- I = Calculate the total per capita income by dividing total GDP to total labour force employed in that year
- J = Per capita income of unpaid family workers in informal sector = H*I
- Informal sector as percentage of overall GDP = (per capita income of informal economy/total GDP)*100

Table 3

Estimation Results of Monetary Approach

Dependent Variable: CFM2				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	–72.858	19.016	–3.831	0.001
TY	2.687	1.300	2.068	0.053
INF	0.216	0.129	1.677	0.110
POP	22.113	5.313	4.162	0.001
CFM2(–1)	0.252	0.156	1.615	0.123
DD	8.785	2.243	3.916	0.001
BS	10.389	3.270	3.177	0.005
Y	–0.018	0.291	–0.062	0.952
R	1.287	0.405	3.176	0.005
Diagnostic Tests:				
R-squared	0.856865	Mean dependent var		33.31071
Adjusted R-squared	0.796598	S.D. dependent var		5.333016
S.E. of regression	2.405198	Akaike info criterion		4.848233
Sum squared resid	109.9146	Schwarz criterion		5.276442
Log likelihood	–58.87526	Hannan-Quinn criter.		4.979141
F-statistic	14.21773	Durbin-Watson stat		2.330675
Prob(F-statistic)	0.000002			

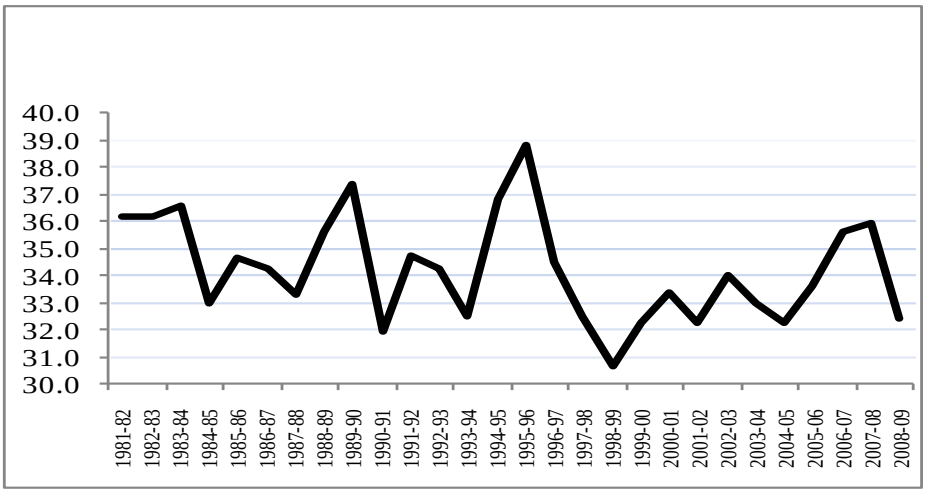


Fig. A1. Informal Economy (as % of GDP) through Monetary Approach

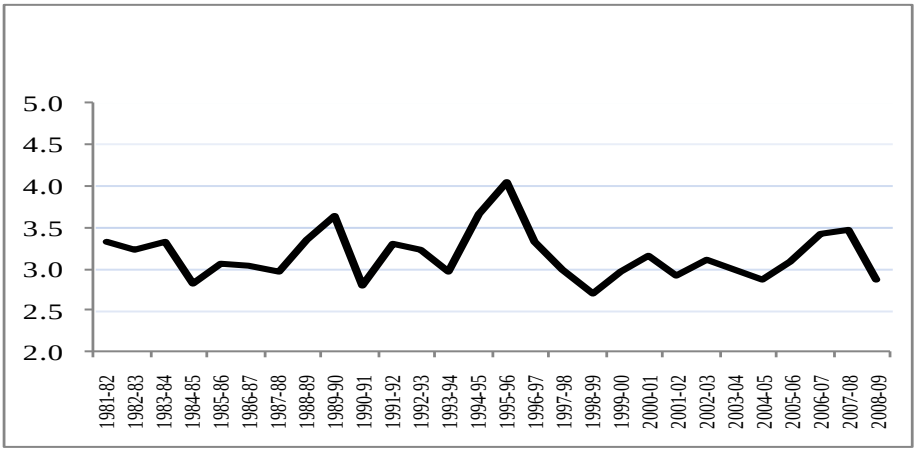


Fig. A2. Tax Evasion (as % of GDP) through Monetary Approach

Table 4

Results of DOLS Using Maximum Likelihood Approach

Dependent Variable: CM Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant Term	36.324	3.454	10.517	0.000
Tax Burden	1.557	0.294	5.296	0.000
Human Capital	0.062	0.047	1.339	0.190
Interest Rate	–0.622	0.105	–5.904	0.000
Financial Development	–0.801	0.081	–9.839	0.000

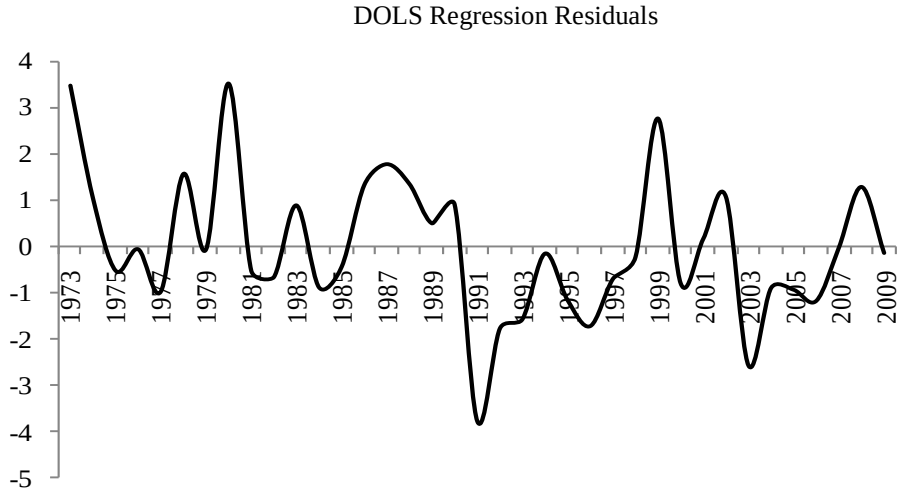
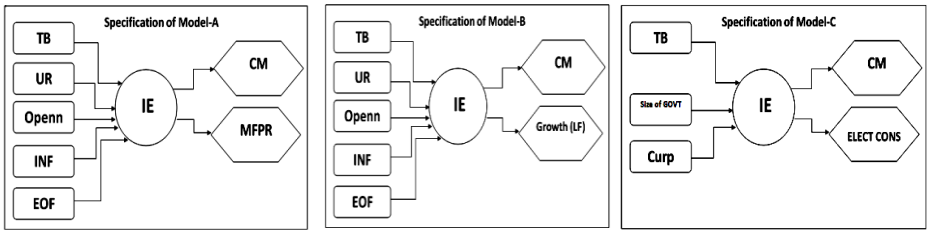


Table 5

Estimation Results of MIMIC Approach[7]

Sr. No.	Cause Variables	Model A Estimates	Model A p-values	Model B Estimates	Model B p-values	Model C Estimates	Model C p-values
1	Tax Burden	–0.971	0.003	0.674	0.163	1.373	0.046
2	Unemployment	0.044	0.777	–0.376	0.094	–	–
3	Openness	–0.082	0.018	–0.098	0.238	–	–
4	Inflation	0.203	0.017	–2.144	0.165	–	–
5	Size of Government	–	–	–	–	0.434	0.000
6	Economic of Freedom	0.120	0.821	–0.104	0.423	–	–
8	Corruption	–	–	–	–	1.913	0.011
	Indicator Variables						
1	Currency Demand	0.353	0.000	–0.058	0.075	0.700	0.000
2	Electricity Consumption	–	–	–	–	1.000	–
4	Male Labour-Force Participation	1.000	–	–	–	–	–
5	Growth Rate in Labour-Force	–	–	1.000	–	–	–
	Model Diagnostics[8]						
1	Global Goodness of Fit[9]	0.793		0.479		0.829	
2	Adjusted Goodness of Fit[10]	0.760		0.397		0.814	
3	Average Log Likelihood	–1.528		–1.964		–6.012	
4	Determinant Residual Covariance	1.927		8.855		95.254	

Note: Authors Calculations.



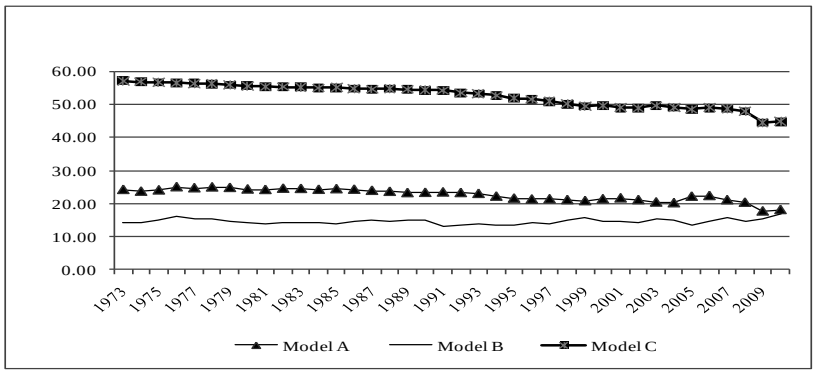


Fig. A3. Informal Economy (as % GDP) through MIMIC Approach

[7]The estimations have been made with the software E-VIEWS 6.0 and LISREL 8.8 (Student version available on internet)

[8]The degrees of freedom are determined by 0.5(q+p)(q+p+1)-t, where p=number of indicators, p=numbers of causes, t=number of free parameters.

[9]P-value for Test of Close Fit (RMSEA<0.05). + means good fitting (p-value>0.05).

[10]Adjusted goodness-of-fit index, AGFI. This indicator takes values into the interval [0, 1].

Table 6

Labour Market Estimation of Informal Economy (as % of GDP)

		Unpaid Family Helpers	Self-employed	Total as % of GDP
2002	**Total**	**24.225**	**41.145**	**65.369**
	Female	10.695	7.029	17.724
	Male	13.530	34.115	47.645
2003	**Total**	**25.982**	**40.640**	**66.622**
	Female	12.251	7.052	19.303
	Male	13.731	33.588	47.319
2004	**Total**	**27.732**	**40.034**	**67.766**
	Female	13.804	7.033	20.837
	Male	13.928	33.001	46.929
2005	**Total**	**29.381**	**39.460**	**68.841**
	Female	13.401	5.839	19.240
	Male	15.981	33.621	49.601
2006	**Total**	**31.018**	**38.606**	**69.623**
	Female	13.000	4.522	17.521
	Male	18.018	34.084	52.102
2007	**Total**	**30.902**	**37.807**	**68.709**
	Female	13.853	4.295	18.148
	Male	17.049	33.512	50.561
2008	**Total**	**32.621**	**37.571**	**70.191**
	Female	14.788	4.324	19.112
	Male	17.833	33.246	51.079
2009	**Total**	**20.717**	**36.492**	**57.210**
	Female	11.605	4.355	15.960
	Male	9.113	32.137	41.250
2010*	**Total**	**18.232**	**34.565**	**52.780**
	Female	10.122	4.215	14.337
	Male	8.110	30.350	38.460

Note: Author Estimates based on Labour Force Survey Data.

*Projections.

Table 7

Informal Economy (as % of GDP), Estimates Using Various Approaches

Year	Elec. Cons	DOLS	MIMIC*	Monetary Based	Labour Force
1973	–	27.656	31.830	–	–
1974	30.675	26.555	31.555	–	–
1975	38.342	26.954	31.954	–	–
1976	43.395	27.539	32.539	–	–
1977	46.344	27.135	32.135	–	–
1978	54.828	27.130	32.13	–	–
1979	56.478	26.773	31.773	–	–
1980	50.079	26.318	31.318	–	–
1981	47.791	26.173	31.173	–	–
1982	51.493	26.413	31.413	36.197	–
1983	56.930	25.653	31.277	36.197	–
1984	52.962	21.825	31.137	36.597	–
1985	57.120	25.971	31.149	32.985	–
1986	62.195	31.015	31.18	34.62	–
1987	57.697	26.570	31.127	34.232	–
1988	52.502	21.568	30.934	33.27	–
1989	51.352	20.454	30.898	35.601	–
1990	55.537	24.739	30.798	37.404	–
1991	46.651	16.476	30.175	31.947	–
1992	46.460	16.443	30.017	34.767	–
1993	56.671	26.693	29.978	34.28	–
1994	44.088	14.611	29.477	32.511	–
1995	43.385	14.366	29.019	36.798	–
1996	51.027	21.996	29.031	38.839	–
1997	47.615	18.884	28.731	34.523	–
1998	54.130	25.356	28.774	32.464	–
1999	49.662	20.990	28.672	30.65	–
2000	58.444	29.887	28.557	32.229	–
2001	56.561	28.145	28.416	33.414	–
2002	60.953	32.850	28.103	32.229	24.225
2003	55.328	26.850	28.478	34.038	25.982
2004	50.814	22.746	28.068	32.985	27.732
2005	49.567	21.510	28.057	32.276	29.381
2006	50.087	21.475	28.612	33.605	31.018
2007	50.975	22.419	28.556	35.601	30.902
2008	36.117	20.345	27.575	35.948	32.621
2009	37.199	19.234	25.867	32.417	20.717
2010	47.627	18.234	26.630	30.554	18.232

*Average estimates of three MIMIC models.

Table 8

Comparison of Pakistan's Informal Economy (as % of GDP) with Other Studies

	Schneider, Büehn and Montenegro (2010) MIMIC	Gulzar, *et al.* (2010) MIMIC*	Gulzar, *et al.* (2010) Average**	Arby, *et al.* (2010) MIMIC	Arby, *et al.* (2010) Average***
1999	37.0	28.7	33.8	29.3	31.0
2000	36.8	28.6	40.2	29.3	26.0
2001	37.0	28.4	39.4	29.3	26.7
2002	36.8	28.1	37.6	29.2	27.5
2003	36.2	28.5	35.5	29.1	28.6
2004	35.3	28.1	33.6	28.9	26.0
2005	34.9	28.1	33.2	28.6	22.7
2006	33.8	28.6	34.0	28.7	22.5
2007	33.6	28.6	35.0	28.8	18.2
2008	–	27.6	31.3	28.9	24.1
2009	–	25.9	27.4	–	–
2010	–	26.6	28.7	–	–

*Average of three Model Specifications.

**Average estimates of all other four approaches [Monetary Approach, Modified Monetary Approach DOLS, Electricity Consumption, Labour Force Survey Approach.

***Average Estimates of two approaches [Modified Monetary Approach using ARDL and Electricity Consumption Approach].

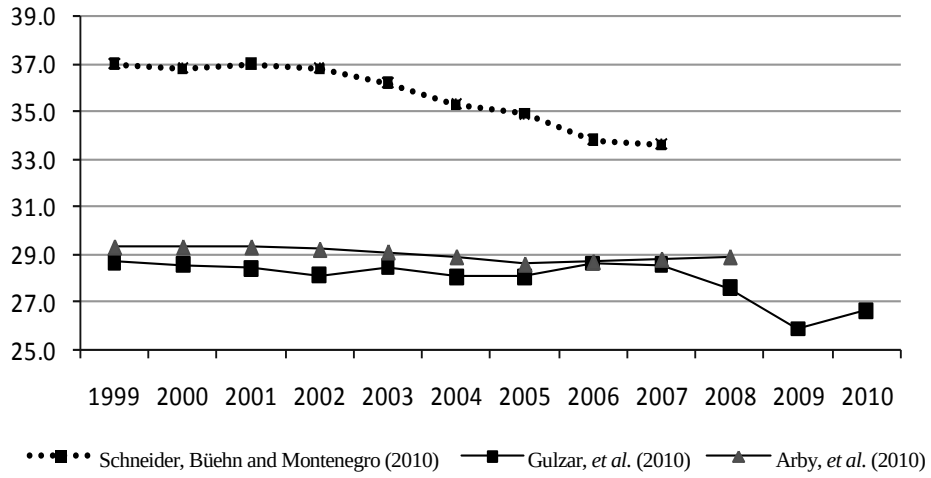


Fig. A4. MIMIC Estimates Comparison of Three Studies

Table 9

Income Growth Rates in Formal and Informal Sectors in Relation with GDP Growth Rates

	Position*			Analysis			
Year	1	2	3	1	2	3	Hypothesis
2002	Informal	Formal	GDP	Major Decrease	Major Increase	Increase	True
2003	Informal	Formal	GDP	Major Increase	Equal Increase		True
2004	Informal	Formal	GDP	Major Decrease	Major Increase		True
2005	Informal	GDP	Formal	Slight Increase	Slight Increase	Major Decrease	False
2006	Informal	GDP	Formal	Major Decrease	Decrease	Major Decrease	True
2007	Formal	GDP	Informal	Major Increase	Slight Increase	Major Decrease	True
2008	Formal	Informal	GDP	Major Decrease	Slight Increase	Slight Decrease	True
2009	Informal	Formal	GDP	Major Increase	Slight Increase	Decrease	False

Note: (M.I: major increase, M.D: major decrease, D: decrease, I: increase, S.D: slight decrease, S.I: slight increase, E.I: equal increase, Mild I: mild increase, Mild D: mild decrease).

*Sequence from 1 to 3 showing a declining trend

*Base Year: 2001

Table 10

Employment Growth in Formal and Informal Sectors in Relation with GDP Growth Rates

	Position*			Analysis			
Year	1	2	3	1	2	3	Hypothesis
2002	Formal	GDP	Informal	Major Increase	Slight Increase	Decrease	True
2003	Informal	GDP	Formal	Increase	Slight Increase	Major decrease	False
2004	GDP	Informal	Formal	Slight Increase	Major Increase	Slight Decrease	False
2005	GDP	Informal	Formal	Slight Increase	Slight Increase	Major decrease	False
2006	GDP	Formal	Informal	Decrease	Major Increase	Major decrease	True
2007	Formal	Informal	GDP	Major Increase	Major Increase	Slight Increase	True
2008	GDP	Informal	Formal	Slight Decrease	Major decrease	Major decrease	True
2009	Informal	GDP	Formal	Slight Increase	Slight Decrease	Increase	False

Note: (M.I: major increase, M.D: major decrease, D: decrease, I: increase, S.D: slight decrease, S.I: slight increase, E.I: equal increase, Mild I: mild increase, Mild D: mild decrease).

*Sequence from 1 to 3 showing a declining trend.

*Base Year: 2001.

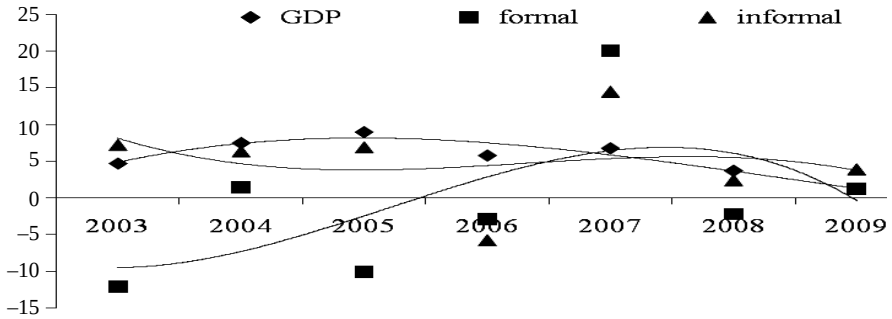


Fig. A5. Real GDP Growth Rates, Growth Rates of Employed Labour Force in Formal and Informal Sectors

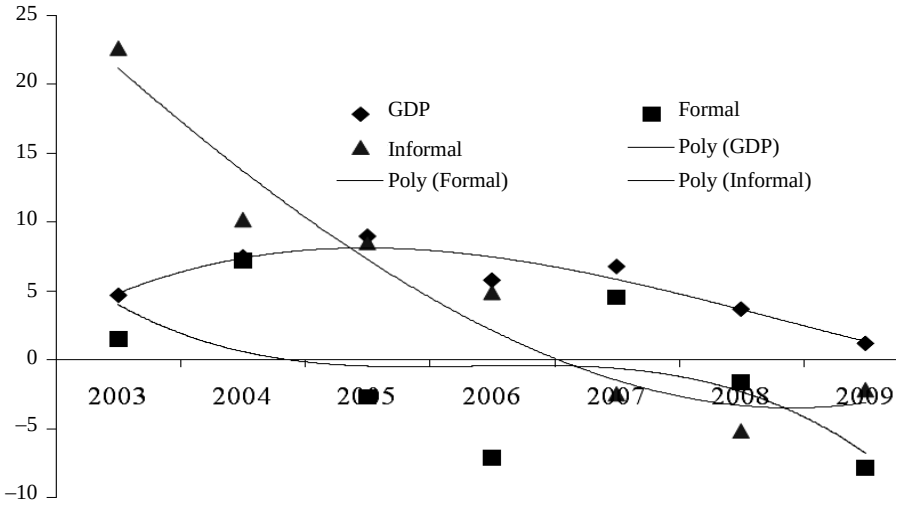


Fig. A6. Real GDP Growth Rates, Growth Rates of Yearly Average Income in Formal and Informal Sectors

Table 11A

Employment Shares in Million

Years	2002	2003	2004	2005	2006	2007	2008	2009	Max	Min	Range	Stdev	Mean
Non-agriculture	22.96	23.04	24.16	24.59	23.37	27.11	27.41	28.28	28.28	22.96	5.33	2.15	25.11
Formal Sector	8.13	7.15	7.26	6.53	6.34	7.62	7.45	7.55	8.13	6.34	1.79	0.59	7.25
Informal Sector	14.82	15.89	16.90	18.07	17.02	19.49	19.96	20.73	20.73	14.82	5.91	2.07	17.86
Disaggregation of Employment Shares (Millions) In Informal and Formal Sectors													
Formal Sector													
Mining and Quarrying	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.06	0.06	0.03	0.03	0.01	0.04
Large Scale Manufacturing	5.40	4.84	4.64	4.17	4.43	4.94	4.42	5.09	5.40	4.17	1.22	0.40	4.74
Electricity, Gas and Water	0.32	0.30	0.28	0.29	0.27	0.36	0.35	0.36	0.36	0.27	0.09	0.03	0.32
Public Sector Construction	0.55	0.69	0.85	0.78	0.66	1.15	1.34	1.21	1.34	0.55	0.79	0.29	0.90
Finance and Insurance	0.35	0.39	0.45	0.47	0.45	0.55	0.70	0.28	0.70	0.28	0.41	0.13	0.46
Transport and Communication	1.49	0.91	1.01	0.79	0.48	0.56	0.59	0.55	1.49	0.48	1.00	0.34	0.80
Informal Sector													
Small Scale Manufacturing	0.09	0.51	1.19	1.84	1.28	1.34	1.45	1.68	1.84	0.09	1.75	0.59	1.17
Wholesale and Retail Trade	5.89	6.00	6.28	6.37	6.05	7.16	7.81	7.32	7.81	5.89	1.92	0.72	6.61
Private Sector Construction	1.85	1.72	1.62	1.80	1.86	2.00	1.78	2.20	2.20	1.62	0.57	0.18	1.85
Social and Personal Services	6.14	6.17	6.37	6.34	5.92	6.93	6.76	1.33	6.93	1.33	5.60	1.82	5.75
Others (Activities not Defined)	0.00	0.01	0.02	0.02	0.02	0.03	0.05	5.64	5.64	0.00	5.64	1.99	0.72
Transport and Communication	0.85	1.48	1.42	1.69	1.89	2.03	2.11	2.56	2.56	0.85	1.71	0.52	1.75

Table 11B

Table 12

Employment Shares (%)

Year	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Non-agriculture	57.91	56.94	56.95	56.9	56.63	56.39	55.35	54.92
Formal Sector	20.52	17.67	17.11	15.1	15.37	15.85	15.05	14.66
Informal Sector	37.39	39.27	39.84	41.8	41.26	40.54	40.3	40.26
Disaggregation of Employment Shares (%) in Formal and Informal Sectors								
Formal Sectors								
Mining and Quarrying	0.07	0.07	0.07	0.08	0.09	0.11	0.12	0.12
Large Scale Manufacturing	13.61	11.95	10.93	9.65	10.74	10.28	8.92	9.88
Electricity, Gas and Water	0.81	0.74	0.67	0.67	0.66	0.75	0.70	0.69
Public Sector Construction	1.39	1.70	2.00	1.81	1.61	2.40	2.70	2.35
Finance and Insurance	0.89	0.98	1.06	1.08	1.10	1.14	1.41	0.55
Transport and Communication	3.75	2.24	2.38	1.82	1.17	1.17	1.20	1.07
Informal Sectors								
Small Scale Manufacturing	0.23	1.26	2.80	4.25	3.11	2.78	2.92	3.27
Wholesale and Retail Trade	14.85	14.83	14.80	14.74	14.67	14.90	15.77	14.22
Private Sector Construction	4.66	4.25	3.83	4.18	4.52	4.16	3.59	4.27
Community, Social and Personal Services	15.50	15.26	15.01	14.68	14.35	14.41	13.66	2.58
Others (Activities not Defined)	0.00	0.03	0.05	0.05	0.04	0.07	0.10	10.95
Transport and Communication	2.15	3.66	3.35	3.91	4.57	4.22	4.26	4.97

Table 13

Growth Rates of Employed Labour Force (%)

	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Non-agriculture	0.38	4.84	1.80	–4.99	16.01	1.12	3.19
Formal Sector	–12.09	1.50	–10.08	–2.83	20.14	–2.18	1.30
Informal Sector	7.23	6.34	6.90	–5.77	14.47	2.41	3.90
Growth Rates of Employed Labour force by Economic Activity in Formal and Informal Sectors (%)							
Formal Sector							
Mining and Quarrying	2.09	4.82	16.44	7.40	42.40	12.38	4.00
Large Scale Manufacturing	–10.36	–4.13	–10.05	6.25	11.52	–10.61	15.19
Electricity, Gas and Water	–6.73	–5.10	1.13	–5.25	32.39	–3.85	2.51
Public Sector Construction	24.50	23.68	–8.05	–14.85	73.67	15.89	–9.48
Finance and Insurance	11.84	13.96	3.81	–2.77	20.74	27.42	–59.43
Transport and Communication	–39.02	11.37	–22.09	–38.63	16.51	5.66	–7.27
Informal Sector							
Small Scale Manufacturing	459.30	132.93	54.65	–30.14	4.14	8.20	16.46
Wholesale and Retail Trade	1.92	4.64	1.44	–4.96	18.33	9.03	–6.22
Private Sector Construction	–7.00	–5.43	11.06	3.35	7.23	–11.10	23.70
Community Social and Personal Services	0.48	3.13	–0.35	–6.68	16.99	–2.35	–80.36
Others (Activities not Defined)	0.00	109.64	–8.30	–15.14	103.88	47.17	11287.82
Transport and Communication	73.80	–4.06	18.92	11.58	7.58	3.99	21.33

Table 14

Growth Rates of Average Yearly Income of Employed Labour Force (%)

	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Non agriculture	8.86	8.38	1.76	–2.03	1.35	–3.19	–5.44
Formal Sector	1.51	7.23	–2.72	–7.14	4.54	–1.64	–7.89
Informal Sector	22.62	10.17	8.51	4.89	–2.48	–5.17	–2.18
Growth Rates of Average Yearly Income of Employed Labour force (%) by Economic Activity in Formal and Informal Sectors							
Formal Sector							
Mining and Quarrying	8.78	5.99	0.46	–21.05	31.06	15.35	–0.10
Large Scale Manufacturing	–3.01	–4.37	–8.48	–7.34	–7.21	–10.72	–17.20
Electricity, Gas and Water	24.76	16.91	8.17	–34.99	5.49	0.03	–1.50
Public Sector Construction	–3.01	–4.37	–8.48	–7.34	–7.21	–10.72	–17.20
Finance and Insurance	2.74	0.97	–3.64	31.60	–7.69	–11.18	–14.59
Transport and Communication	–3.01	–4.37	–8.48	–7.34	–7.21	–10.72	–17.20
Informal Sector							
Small Scale Manufacturing	–3.01	–4.37	–8.48	–7.34	–7.21	–10.72	–17.20
Wholesale and Retail Trade	4.12	2.17	–2.62	–16.71	26.23	12.93	–3.43
Private Sector Construction	–3.01	–4.37	–8.48	–7.34	–7.21	–10.72	–17.20
Social and Personal Services	14.00	9.89	3.39	–9.03	10.35	3.49	–3.90
Others (Activities not Defined)	34.74	22.42	11.54	43.43	–28.16	–36.75	–3.48
Transport and Communication	–3.01	–4.37	–8.48	–7.34	–7.21	–10.72	–17.20

Table 15A

Employment Share (%)

	Fast Growth Period						Slow Growth Period	
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Non-Agriculture	57.91	56.94	56.95	56.9	56.63	56.39	55.35	54.92
Formal Sector	20.52	17.67	17.11	15.1	15.37	15.85	15.05	14.66
Informal Sector	37.39	39.27	39.84	41.8	41.26	40.54	40.3	40.26

Source: Labour Force Survey (Various Issues).

Table 15B

Deflated Average Yearly Income (Rs.)*

	Fast Growth Period						Slow Growth Period	
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Non- Agriculture	35977.63	39165.39	42447.57	43194.66	42319.62	42890.64	41524.14	39264.71
Formal Sector	46907.32	47617.44	51058.51	49671.54	46124.22	48220.54	47430.79	43688.65
Informal Sector	25047.93	30713.34	33836.63	36717.77	38515.01	37560.74	35617.49	34840.77

*Deflated by CPI.

Table 16

Average Growth Rates (%)

	GDP	Informal Economy	Tax Evasion	Total Taxes
1983-90	5.93	6.47	7.44	13.33
1991-00	4.41	3.32	3.60	13.13
2001-07	5.55	7.15	7.98	13.72
2008-09	2.45	–2.09	–5.45	17.08

Table 17

Regression Results

Dependent Variable: Growth rate of Informal Economy				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004	1.30	0.003	0.990
Rate of Return on Advance	–0.160	0.06	–2.531	0.019
Inflation	–0.080	0.03	–2.321	0.030
GDP growth rate	0.200	0.07	2.645	0.015
Corruption	–0.026	0.01	–1.656	0.112
Tax Evasion growth rate	0.579	0.01	47.22	0.000
Diagnostic Tests:				
R-squared	0.99	Mean dependent var		4.845
Adjusted R-squared	0.992	S.D. dependent var		7.83
S.E. of regression	0.68	Akaike info criterion		2.268
Sum squared resid	9.79	Schwarz criterion		2.556
Log likelihood	–24.62	Hannan-Quinn criter.		2.35
F-statistic	680.8	Durbin-Watson stat		2.013
Prob(F-statistic)	0.0001			

Table 18

Province-Wise Flood Affected Areas

	(000 Acres)
Punjab	1200
Sindh	1400
KPK	200
Balochistan	532
AJK	64
Gilgit	21.9
Total	3417.9

Total Losses only on crops: Rs 501.923 billion

Total funds required for disbursement : Rs 8.200 billion

Source: Ministry of Food, Agriculture and Livestock.

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Can Sectoral Re-allocation Explain the Jobless Growth? Empirical Evidence from Pakistan

AZAD HAIDER

INTRODUCTION

The present paper discuss the nature of structural changes in employment to understand jobless growth in Pakistan for the period spanning over 1967–2008. In our work (elsewhere)[1] analysing Pakistan at sectoral level to find underlying factors generating jobless growth, we found that Jobless growth in manufacturing sector was anticipated. Industrial sector has a significant importance in any economy across the glob. Recent changes in the use of capital—based foreign technology has resulted in substitution of labour with non-labour inputs such as capital. Employment shifts between industrial sectors are often witnessed as indicators of Structural change in an economy. In this paper we are more interested in the nature of structural change that took place in Pakistan economy over 1967–2008. We set to analyse four commonly used measures of sectoral reallocation proposed by Lilien (1982), Groshen and Potter (2003), Rissman (1997), and Aaronson, Rissman and Sullivan (2004). Findings of our work are suggesting that the economy of Pakistan underwent structural change during periods of recession and recovery. However, it does appear that structural changes were more pronounced at the time of 1969 recession than that of 1991 recession. A plausible explanation for this result might be significant shifts in employment from agriculture towards services sectors. We conclude, based on the evidence from our study, that sectoral reallocation is one of the major causes of jobless growth in Pakistan.

The rest of the paper is as structured as follow: Section 1 discusses the structural shift in the Pakistan economy and also compares it with some developed and developing countries especially in term of employment by economic activity. Based on past literature four commonly measures of sectoral reallocation are identified in Section 2 provides a brief review of the relevant literature. Estimation methodology and results are reported in Section 3 while section four concludes the paper along with drawing some policy lessons.

1. STRUCTURAL SHIFTS IN THE ECONOMY

The structural adjustments across the growth trajectory have been studied at extent in literature documenting past experience of the industrial country over two centuries.

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[1]Unpublished work of the main author.

Generally, the growth patterns of today's industrial countries can be marked by three diverse stages: an initial stage with agriculture being the powerful sector of the economy, an intermediate stage dominated by industrial sector and a final stage with services sector leading the growth process. The timing and length of different stages of structural change are different across these countries. The industrial sector accounted for 50 percent of total output at the climax of structural change and in later stage this share declined to 25 percent for these countries.

Employment by Economic Activity

Things look clearer when put in comparison to each other. The dynamics of sector wise employment in Pakistan can be easily grasped when compared with other developed and developing countries. Tables 1(a) and 1(b), given below, depict the share of employment by economic activity of selected developed and developing countries respectively.

As is evident from the tables below, employment share by economic activity, share of employment in agriculture sector is very low in developed countries as compared to developing countries. In 1980 employment share of agriculture in developing world, on average, is above 50 percent almost in all countries and in 2005 it decreases to 40 percent. On the other hand, in developed countries, agriculture sector share of employment falls from less than 10 percent and below 5 percent from over the same period. Same patterns are registered for industry sector for developing and developed economies. While employment share of Services sector for developed countries increased from 55 percent above 70 percent during 25 years comprising 1980-2005.

Table1 (a)

Share of Employment by Economic Activity (%) (Year 1980 and 2005)
Developed Countries

	1980			2005		
Country	Agriculture	Industry	Service	Agriculture	Industry	Service
UK	2.6	37.2	58.9	1.4	22.0	76.6
USA	3.6	30.8	65.7	1.6	20.6	77.8
France	8.7	35.9	55.4	3.8	24.3	71.5
Japan	10.4	35.3	54.0	4.4	27.9	66.4
Germany	4.2	40.3	55.5	2.4	29.7	67.8
Italy	14.0	37.2	48.7	4.2	30.7	65.1
Australia	6.5	31.0	62.4	3.6	21.1	75.0
Canada	5.4	28.5	66.0	2.7	22.0	75.3
New Zealand	10.9	33.8	55.3	7.1	22.0	70.6
Spain	19.3	35.9	44.7	5.3	29.7	65.0

Source: World Development Indicators (WDI), 2008.

Data on Germany is for comparison is from 1991 and 2005, because reunification of Germany was in 1990.

On the contrary, service sector share in total employment is 30 percent and increased to 40 percent in 2005 in developing countries. As is evident from Table 1(b) agriculture sector contributes more than half of total employment for developing countries. Worth mention, however, is that countries with large share of employment in agriculture sector are prone to jobless growth.

Table1 (b)

Share of Employment by Economic Activity (%) (Year 1980 and 2005)
Emerging Economies

	1980			2005		
Country	Agriculture	Industry	Service	Agriculture	Industry	Service
China	68.7	18.2	11.7	44.1	25.5	28.7
Indonesia	56.4	13.1	30.4	42.1	18.6	39.3
Thailand	70.8	10.3	18.9	42.6	20.2	37.1
Philippines	51.8	15.4	32.8	37.0	14.9	48.1
Malaysia	37.2	24.1	38.7	14.8	30.1	55.1
Korea Rep.	34.0	29.0	37.0	7.9	26.8	65.1
Pakistan	52.7	20.3	26.8	43.0	20.3	36.6
India	69.1	13.6	17.3	57.0	21.0	22.0
Sri Lanka	45.9	18.6	29.3	33.5	22.8	36.8
South Africa	10.9	25.1	63.9	10.3	24.5	65.1
Bangladesh	64.8	11.0	24.2	51.7	13.7	34.6

Sources: 1. World Development Indicators (WDI), 2008.
2. Data for Indonesia is for 2006 as the most recent year given in WDI, 2008.
3. Data for China is for year 1980 and 2002, as the most recent year given in WDI.
4. Data for India's sectoral employment share is derived from various sources for1990 and 2002.
5. Data on South Africa is 1999 and 2003; Bangladesh is for1983- 2003 and Sri Lanka for 2004 as the most recent year given in WDI, 2008.

As we noted in Table 1 (a) that in developed countries, such as, Europe, North America and Oceania, the share (also in absolute term) of agriculture employment was continuously decreased. According to Fei and Renis (1976), this is an important turning point in the process of structural change and without any additional labour input, this agricultural productivity growth is sufficient to sustain the food supply of growing numbers of peoples. On the contrary, Table 1 (b) show the different pattern of agriculture employment in many developing countries and share of agriculture employment continuously declined, even though in absolute term the numbers of jobs has continued to increase in agriculture sector.[2]

On the other hand, developed and developing countries show the typical pattern of employment in industrial sector. Relative share of employment in industrial sector steadily increased in developing countries, whereas in developed countries this share reached its highest point. Whereas, on the last stage of structural change in the economy, as Kuznets (1965) said that "the shift of employment towards services can be stated as a

[2]*Source:* ILO, Economic active population, 1950–2010.

stylised fact of the post war economic development" shift of employment to services is a very diverse process. Firstly, in general services is a major contributor to economic growth, secondly, services can also arise as a result of the rise of the welfare state and finally, employment growth in the service sector can result from a lack of productivity growth in the rest of the economy. As one argument given by Baumol (1967) that "there are inherent problems of increasing productivity growth in services".

2. LITERATURE REVIEW

Structural change in the labour market, also called sectoral change or reallocation, is said to occur in a labour market when there are changes in the composition of aggregate demand for goods and services, or when there are changes in the productivity of labour, that result in an industrial shift in labour demand. When the labour market is undergoing structural change, workers may lose jobs because their current skills are no longer in demand. Hence, if an economic growth is accompanied by structural change, there is a potential for this growth to be jobless.

This possible explanation of jobless growth in the United States was first suggested by Aghion and Howitt (1994) and then later empirically studied by Rissman (1997), Groshen and Potter (2003) and Aaronson, *et al.* (2004). They claimed that a substantial percentage of a dismissal of employees can be recognised to permanent rather than short-term. Permanent dismissals of employees are a feature of structural unemployment as industries fade away. They explained that indicative of structural change are industries that continue to lose jobs after having lost jobs during the last recession or industries that continue to gain jobs after having gained jobs during the last recession. Exactly what is driving the structural change, however, is not clearly established. One explanation might be the relative position of the US in the international economy. Indeed, Bernanke (2003) suggested that trade might be a factor that accounts for the change. When there is stronger structural change, as observed in the last decade and discussed above, labour market search and matching institutions become important in helping to match the supply of vacancies to the demand for labour through job searches by the unemployed [other labour market institutions, such as the type and length of labour contracts, are also important, see also Okun (1962)]. On the other hand when there is a weak structural change, economic agents should look to set up forward and backward linkages between various sectors of the economy.

Some studies have also examined the relationship between sectoral changes and business cycles. These studies, including Lilien (1982), Abraham and Katz (1986), Davis (1987), Loungani, Rush, and Tave (1990), Campbell and Kuttne (1996) and Baily, Bartelsman and Haltiwanger (1998), analyse the cyclical behaviour of both components of sectoral reallocation, within the plant and across the plant and found that changes in productivity are counter cyclical. On the other hand, Bar Levi (1998) looks at how incentives for workers to wait until recoveries to start looking for new jobs can impart a pro-cyclical bias to labour productivity. While Merz (1995), Andolfatto (1996), and Den Haan, Ramey, and Watson (2000) investigate that how reallocation can intensify and /or transmit aggregate shocks.

Lilien (1982), along with Rissman (1997) and Aaronson, *et al.* (2004), is prominent work on measure of sectoral reallocation. All these studies measure the

dispersion across industrial sectors. Groshen and Potter [Pakistan (2003)], another most cited study in the recent literature, measure GP statistic on the basis of cross correlation across sectors in the phases of business cycle and "identify sectoral reallocation as the cause of the recent jobless growth". But Aaronson, *et al.* (2004) criticised on the GP statistic that "the correlation between employment growth rates during and after recessions—is a particularly close proxy for sectoral reallocation".

3. MEASURES OF SECTORAL REALLOCATION: PAKISTAN'S ECONOMY

If economic growth is accompanied by structural changes in the economy, workers may have to retrain and update their skills. Hence, some unemployment may occur in the economy thereby weakening the relationship between employment and GDP growth rates. Structural change of an economy is often proxide by employment shifts between industrial sectors. An in-depth analysis of structural change in the economy requires disaggregated employment data within each of the seven sectors identified in Appendix Table A1. Unfortunately, such disaggregated data are not available. Hence, only some broad patterns of sectoral change are analysed for the present study.

Four measures of structural change in the economy are commonly used in the literature. These measures have been proposed by Lilien (1982), Groshen and Potter (2003), Rissman (1997), and Aaronson, Rissman and Sullivan (2004) and are discussed below. The measure proposed by Groshen and Potter (GP) is discussed first. Because of the similarities between the other three measures, they are discussed after the GP measure.

Groshen and Potter's (GP) Measure

Following Groshen and Potter (2003), industrial sectors that continue to experience slower than average employment growth during and after recession as well as the sectors that continue to experience faster than average employment growth during and after recession can be considered as undergoing structural change. The statistic suggested by these authors, the GP statistic, measures the percentage of such sectors in all sectors of the economy. In present study, we analyse Pakistan's economy at sectoral level divided into seven sectors.[3] Guided by data limitations annual data are used for each sector's employment, although it will be preferable to use monthly data but they are not available.

Employment growth rate in each sector is compared with the average employment growth rate during different phases of the business cycle as shown in Table 2.[4] The signs of sectoral changes concluded in columns (11) and (12) are for the start of recessionary and recovery periods as they are for one year after peak and trough. To account for any randomness in employment fluctuations that could affect employment growth in these years, employment changes in peak and trough are also compared (over an entire half cycle) and signs of sectoral change concluded in columns (9) and (10). To help the intuition of the reader, an example is provided in the notes below Table 2.

[3]See Appendix Table A1.

[4]When monthly data are used, GP's measure is based on a recession period that starts one month after the business cycle peak and an 11-month post-recession period that begins the month after the business cycle trough.

Table 2

From Table 2 it can be seen that when one compares employment growth rates from one year into recession to one year into recovery (one year after peak and one year after trough as reported in columns 11 and 12), the effect of structural change in the economy appears somewhat less pronounced in the 1969-70 recession than it was in the 1991-92 recession. During the 1969-70 recession, a sectoral employment change was observed in four sectors while this was the case in five sectors during the next recession. Electricity, water and sanitary sectors did not experience any structural shift, collectively. If one considers employment growth rates over the half business cycle (in peak and trough as reported in Columns 9 and 10), then the structural shifts are found to be even less pronounced during 1969-70 as this occurred only in three sectors. However, the electricity, water and sanitary sector does show structural shift under this method. Only the transport and communication sector is found to have experienced structural shifts under both methods during both recessions. All other sectors show mixed results.[5]

While one weakness of the above analysis is its use of aggregated data, another weakness is that it is based on only four data points which may not capture full fluctuations in employment during the period. Other measures such as those provided by Lilien (1982), Rissman (1997) and Aaronson, *et al.* (2004) are improvements over the GP measure. All three measures consider deviations of annual employment from a standard level, but differ in the measurement of this deviation. These methods are discussed next, followed by their results.

Lilien's Measure

Lilien (1982) holds that in the absence of structural change, employment in all sectors will grow at the same rate. By contrast, "when labour is being reallocated across industries, expanding industries will grow faster than average and contracting industries will grow slower". Lilien proposed a measure of structural change based on the standard deviation of employment growth rates across industrial sectors calculated as follows:

$$\sigma_t^L = \left[\sum_{i=1}^{n} S_{it} (GE_{it} - GE_t)^2 \right]^{\frac{1}{2}}$$

Where GE_{it} is employment growth in sector *i* at time *t*, GE_t is the combined employment growth rate for all sectors or it is the national average growth rate in employment, and Sit is the share of total employment in sector i at time t.[6] If all sectors grow at the same rate, Lilien's measure would be zero. The measure is always positive and larger, the more an individual sector's employment growth rate exceeds the average. The variable σ_t^L is called the Lilien measure of structural change.

[5]Groshen and Potter (2003) also provided a descriptive statistic based on the correlations between the difference of employment growth rate in each sector from the national average before and after recession. This statistic will not be meaningful for present study due to small number of observations (only seven).

[6]A sector's employment growth is related to its share of employment by the following mathematical relationship: $\Delta Ln\,(S_{it}) = \Delta Ln\,(E_{it} / E_t) = GE_{it} - GE_t$.

Some economists, such as Abraham and Katz (1986) have criticised the Lilien measure.[7] They note that employment growth in some sectors, such as the commodity-producing sectors, typically declines faster during economic downturns than employment growth in service-producing sectors, even if there is no actual impact of this change on aggregate employment. Consequently, sectoral change as measured by Lilien captures both the process of sectoral change and the normal employment flows of the business cycle. The measure does not tell us which sector is positively or negatively affected by recession or recovery.

Rissman Measure

Rissman (1997) tried to incorporate Abraham and Katz's criticism of the Lilien's measure. The Rissman measure is based on a decomposition of the time series of sectoral employment share growth rates into three components. The first component reflects the long-term growth trend of employment in each sector. The second component, as noted by Abraham and Katz (1986), is the predictable movement of employment into and out of certain industries over the business cycle. The third component is the unexpected movement (which Rissman calls idiosyncratic shocks) of workers across sectors or industries, i.e., changes across sectors that occur for reasons distinct to business cycles or long-term secular reasons.

Similar to Lilien (1982), Rissman proposed a measure of sectoral change based on the estimates of idiosyncratic shocks, $\hat{U}_{it}$. Specifically,

$$\sigma_t^R = \left[\sum_{i=1}^{n} \hat{S}_{it-1} (\hat{U}_{it})^2 \right]^{\frac{1}{2}}$$

The term $\hat{S}_{it-1}$ is sector *i*'s acyclic employment share at time *t*–1. This employment share is hypothetically what the sector's employment share would have been if the national employment cycle were held constant at a value of zero, i.e., national employment was stagnant. The acyclic employment share would depend only on the sector's long-term trend and i.e., random, idiosyncratic shocks. The $\hat{U}_{it}$'s are estimates of the idiosyncratic shocks for each sector obtained from the H.P filter estimation exercise.

Aaronson, Rissman and Sullivan Measure

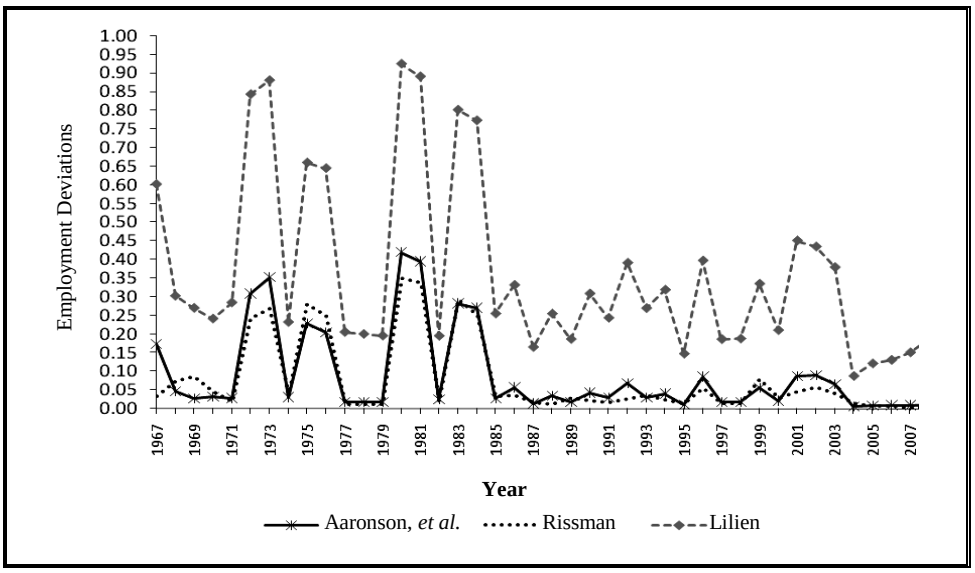
Aaronson, Rissman and Sullivan (2004) provide a broader measure of sectoral change that includes long-term change in a sector employment share $\hat{T}_i$ separately as a sectoral shift. Their measure is given by:

[7]The findings of Abraham and Katz (1986), Loungani, Rush, and Tave (1990) and Rissman (1993, 1997) contrast with Davis and Haltiwanger (1992) who find that 99 percent of reallocation is within 2-digit industries and 88 percent within 4-digit industries. Davis and Haltiwanger emphasise the importance of within-sector reallocation to avoid Abraham and Katz's (1986) criticism of Lilien (1982). By definition, differential responses of sectors to common shocks cannot be responsible for the correlation of within sector reallocation with the cycle. The difference between the Davis and Haltiwanger measures of across-industry reallocation and the results presented here owe to temporary reallocation. Davis and Haltiwanger compute reallocation as the sum of job creation and job destruction, and this includes many short-term job flows. Thus, while temporary reallocation is overwhelmingly a within-sector phenomenon, permanent reallocation is not.

$$\sigma_t^A = \left[\sum_{i=1}^{n} \hat{S}_{it-1} (\hat{T}_i + \hat{U}_{it})^2 \right]^{\frac{1}{2}}$$

The above measure calculates variations in the composition of sectoral employment growth that are unrelated to the normal shifts that occur as the result of business cycle. Figure 1 plots the above three measures of structural change obtained for Pakistan's economy. The data are provided in Appendix Table A2.

Annual dispersions in sectoral employment, using the above three measures, are provided in Figure 1. Lilien's method shows that sectoral employment growth deviations around the national growth have been positive in all years indicating that Pakistan's economy has been experiencing structural changes in all years. However, the measure did not show a systematic pattern until 2003. It dropped during the 1969-70 recession while it rose during the 1991-92 recession indicating more pronounced structural changes during the later recession.



Source: Based on own calculations presented in Appendix Table A2. Lilien's measure is based on sectoral employment growth deviation from the national employment growth. Rissman's measure is based on shifts in the employment composition that are unrelated to the business cycle. Finally, the Aaronson, *et al*. measure is similar to that of Rissman, but it also includes long-term change in sector employment as a sectoral shift.

Fig. 2. Lilien, Rissman and Aaronson, *et al.* Measures of Sectoral Variations in Employment, Pakistan (1967-2008)

The other two measures of employment dispersion are lower because of the way they are measured. These two measures also indicate an overall structural change in the economy, although the evidence is weak in recent years. Hence, it may be concluded that structural changes did take place during the two recovery periods in Pakistan. Finally, the data plotted in Figure 1 show that all three measures of structural shift are sensitive to business cycles.

A summary of the three measures of sectoral change is provided in Table 3. On average, more employment shifts took place between sectors during the ten years of first recession as was also true for the first recovery period.

Table 3

Comparison of Three Measures of Sectoral Allocation in Recoveries and Recessions

	Average Dispersion of Employment Growth			
	Recession		Recovery	
Sectoral Change Measure	1969-70 to 1978-79	1991-92 to 2001-02	1979-80 to 1990-91	2002-03 to 2007-08
Aaronson, *et al.*	0.123	0.047	0.134	0.017
Rissman	0.117	0.035	0.117	0.011
Lilien	0.438	0.302	0.444	0.175

Source: Based on own calculation presented in Appendix Table A2.

The above discussion mostly focused on periods of recession. The three measures also exhibit similar trends during periods of recovery.

4. CONCLUSION

In the present study, three measures of sectoral reallocation show identical results in recession and recovery. The 1969-70 recession and recovery was very much affected by sectoral reallocation as compared to the 1991-92 recession and recovery. An examination of employment by industrial sectors in Pakistan shows that the structural change taking place in the Pakistani economy is not necessarily benefiting the bulk of workers who lack decent employment.[8] This evidence indicates significant sectoral reallocations in Pakistan.

In conclusion, the analysis of structural change based on aggregated employment data for seven sectors of the economy yields some mixed results. This result is largely due to significant shifts in employment from agriculture towards services sector as recorded in GP method. The GP method also recorded significant changes in the transport sector. The "Yellow Cab" scheme introduced in the mid-1990s by the regime of former Prime Minister Nawaz Sharif, which made it easier for investors in transport sector to import vehicles from abroad, may have caused an expansion of this sector.

Some policy lessons can be drawn from the findings of our study. Expansion of industrial sector and a gradual shift of workforce from agriculture sector to industrial sector can reduce jobless growth vulnerability for Pakistan. Well coordinated labour policy based on market driven demand of skills with a focus on targeted areas of economy as leading growth sector can be identified. The areas having greater absorption

[8]Some estimates suggest that employment in the informal economy increased from 66 per cent of non-agricultural employment in 1999-2000 to 72 per cent in 2007. During the same period, wage and salaried employment increased by not more than 1.7 percentage points of the employed, while the number of self employed workers decreased by more than seven percentage points. The percentage of the employed working excessive hours declined slightly, but only because the percentage of females in total employment had increased. The percentage of male workers working excessive hours rose to more than 47 percent (Pakistan Employment Trends, No. 2, 2007).

capacity can lead the path to avoid or minimise jobless growth. A continuous skill enhancement, trainings of labour force, especially involved in traditional sectors of economy, matching with market driven skill demand minimises the fluctuations in employment status hence lessens chances for jobless growth. Labour intensive sector lead growth recoveries can avoid jobless growth remarkably and this is especially relevant for countries like of Pakistan with surplus labour-especially so in agricultural sector.

In summary, the different measures show that the economy of Pakistan underwent structural change during periods of recession and recovery. However, there is an indication of stronger structural changes in the 1970s than in other periods. In conclusion, there is sufficient evidence to suggest that sectoral reallocation in Pakistan during 1968-1985 was a main cause of the jobless growth during that period. When more disaggregated data are available, one can perform an in-depth analysis of employment shifts within each of the seven sectors to investigate if these shifts caused production in each sector to become more or less capital intensive.

APPENDIX

Table A1

Sectoral Compositions of Pakistan Economy

1. Agriculture
- i. Major Crops
- ii. Minor Crops
- iii. Livestock
- iv. Fishing
- v. Forestry

2. Industry
- **2.1. Manufacturing**
  - i. Mining and Quarrying
  - ii. Manufacturing
    - (a) Large-Scale
    - (b) Small-Scale
- **2.2. Construction**
- **2.3. Electricity and Gas Distribution**

3. Services
- **3.1. Transport, Storage and Com.**
- **3.2. Trade and Finance**
  - i. Wholesale and Retail Trade
  - ii. Finance and Insurance
- **3.3. All others Services**
  - i. Ownership of Dwellings
  - ii. Public Administration and Defence
  - iii. Community, S and P Services

Table A2

Measures of Sectoral Change

Year	Aaronson, *et al.*	Rissman	Lilien
1967	0.1727	0.0337	0.6017
1968	0.0461	0.0745	0.3019
1969	0.0271	0.0860	0.2695
1970	0.0309	0.0449	0.2408
1971	0.0275	0.0183	0.2841
1972	0.3075	0.2412	0.8429
1973	0.3519	0.2686	0.8806
1974	0.0301	0.0380	0.2316
1975	0.2280	0.2809	0.6595
1976	0.2042	0.2486	0.6444
1977	0.0175	0.0106	0.2050
1978	0.0168	0.0104	0.1996
1979	0.0170	0.0110	0.1951
1980	0.4189	0.3503	0.9245
1981	0.3947	0.3389	0.8907
1982	0.0237	0.0172	0.1947
1983	0.2818	0.2928	0.8011
1984	0.2692	0.2520	0.7726
1985	0.0266	0.0325	0.2543
1986	0.0567	0.0343	0.3311
1987	0.0132	0.0147	0.1645
1988	0.0334	0.0117	0.2542
1989	0.0174	0.0282	0.1860
1990	0.0417	0.0204	0.3082
1991	0.0290	0.0148	0.2428
1992	0.0670	0.0259	0.3905
1993	0.0283	0.0352	0.2690
1994	0.0401	0.0224	0.3184
1995	0.0092	0.0131	0.1465
1996	0.0855	0.0546	0.3968
1997	0.0172	0.0125	0.1856
1998	0.0176	0.0143	0.1872
1999	0.0558	0.0795	0.3346
2000	0.0205	0.0277	0.2098
2001	0.0862	0.0453	0.4504
2002	0.0895	0.0557	0.4342
2003	0.0645	0.0390	0.3787
2004	0.0055	0.0123	0.0868
2005	0.0077	0.0072	0.1205
2006	0.0085	0.0052	0.1300
2007	0.0084	0.0013	0.1501
2008	0.0098	0.0031	0.1863

Source: Based on author's own calculations.

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Monetary and Non-monetary Gift Exchange

SAIMA MAHMOOD and ASAD ZAMAN

1. INTRODUCTION

A standard labour contract has two important components, agreed upon wage from principal and efforts that in return is provided by agent. On one hand both principal and agent have full knowledge of wage, while information on provided effort level is always incomplete due to its abstract nature. Principal can only observe output of agent, which is joint function of effort, skill level and work environment [Green (1992)]. Assuming economic agents strictly follow their material gain, the game theoretic model predicts that agent will utilise minimum possible effort level. Similarly, the principal will pay minimum wages, since additional wages cannot extract additional effort.

In contrast, the gift exchange model (GEM) is based on the critical assumption that reciprocal behaviour creates a positive relationship between wages and workers' effort levels [Akerlof (1982, 1984)]. Workers are assumed to reciprocate higher wage levels from firms by increasing their effort (positive reciprocity) and /or by decreasing their effort in retaliation for low wage (negative reciprocity). In labour market as partial gift exchange, the loyalty of workers is exchanged for higher wage, and this loyalty then can be translated to higher productivity through effective management. Experimental evidence has supported the reciprocity hypothesis both in laboratory [Fehr and Falk (2008); Fehr, *et al.* (1993); Fehr and Tougareva (1995); Fehr and Falk (1999); Fehr, *et al.* (1998); Fehr, Gächter, and Kirchsteiger (1997)] and in the field [Falk (2007); Henning-Schmidt, *et al.* (2005); Bellemare and Shearer (2007)].

In the real world, we find widespread use of both monetary and non-monetary incentives for labourers. Monetary incentives include provision of reward in terms of money i.e. such as commissions and bonuses, while non-monetary incentives involve non-cash payments (in-kind perk, small gifts, tickets to restaurants, picnics, social event organised at work place, encouraging employees by providing them job autonomy, involvement in decision-making, recognition certificates, assigning challenging duties, etc). It is traditional in economic theory to convert non-monetary incentives into money equivalents, and deal with only one type of incentive for labour.

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However, emerging research shows that the two types have different effects. For example, "*According to a March 1998 survey by The Gallup Organisation Inc. and Carlson Marketing Group Inc., almost 70 percent of the 2,000 IT employees polled said nonmonetary benefits provide the best motivation for sticking around. The study also revealed that employees favour recognition from managers and supervisors by a margin of almost 2 to 1 over recognition such as large cash bonuses or salary raises tied to productivity*". [Villano (1999), para. 5].

Jeffrey and Shaffer (2007) give distinct features of tangible gifts like justifiability, social reinforcement, separability and evaluability. In his influential paper, Jeffery (2002) analysing the use of monetary and non-monetary motivational strategies, argue that cash doesn't have the trophy value, does not have long life—it comes and goes. Non-monetary incentives, on contrary, have higher trophy value thus higher utility value is attached to it. Monetary rewards are treated as compensation (for doing hard work), while non-monetary rewards are treated as recognition [Pfister (2007)], and these are treated differently by employees. Any monetary incentive merged with the salary is considered as salary and not as rewards. Experiments based on concepts from social exchange theory have clearly shown that the economic implication for both kinds of incentives differ significantly [Heyman and Ariely (2004); Kube, *et al.* (2008)]. Even though nonmonetary incentives are commonly used in real world, economic literature implicitly or explicitly assumes that non-monetary incentives can be translated to monetary equivalents, which introduces bias in research.[1] The objective of this paper is to capture gift exchange mechanism in labour market specifically using monetary and non-monetary gifts. Under standard assumptions of economic theory, non-monetary gift (diary here) should result in similar productivity gain to its equivalent cash alternative. Many labour market studies, using this argument, pool up all money and non-money incentives into their monetary equivalent by ignoring the practical implication of using different kinds of incentives.

The exchanges in labour market are assumed to operate through market norms, where employees exchange their effort and time for monetary rewards. Heyman and Ariely (2004) argue that we are living in two markets simultaneously: social and money market. There is strong conflict between the two markets; money market operates strongly on the basis of payment and material gain. Exchanges in money market are on-spot, sharp and short term in nature. Exchanges in social setup are long term, coordinated, consistent and independent of magnitude of payment. Any occurring exchange operates either in money market or through social network, so if one is used other one is driven out. Heyman and Ariely (2004) in series of experiment using monetary and non-monetary incentives for real effort task show that reciprocal behaviour for monetary gift was lower than non-monetary gift and was sensitive to magnitude of payment. This perspective can shed light on the well-established observation that people sometimes expend more effort in exchange for no payment (a social market) than they expend when they receive low payment (a monetary market). [Heyman and Ariely (2004), p. 787]. They also show mixed markets of both social and monetary norms more closely resemble monetary than social markets.

[1]There are only few exceptions for non-monetary incentives as motivational tool in labour market like Kube, *et al.* (2008) and Bandiera, *et al.* (2009). Ariely (2008), Heyman and Ariely (2004) in their series of experiments showed that non-monetary incentives work more than reciprocal behaviour, these help to build consistent long-term response which is independent of magnitude of payment.

This paper borrows heavily from Heyman and Ariely (2004) and Kube, *et al.* (2008). Both of these studies find that non-monetary gift provide stronger incentives than equivalent monetary gift. However, Heyman and Ariely (2004) attribute this higher efficiency to gift exchange mechanisms [GEM], while Kube, *et al.* (2008) attribute it to kind intentions signalled through non-monetary gift.

We have conducted this comparative experimental study in Jun-Sep, 2008 to evaluate the use of two different incentives in gift exchange framework. We have chosen two kinds of gifts for testing the GEM: non-monetary gift (Diaries) and cash equivalents. Results are similar to that of Heyman and Ariely (2004) and Kube, *et al.* (2008): non-monetary gifts result in significantly higher productivity gain compared to cash equivalents. Further, this experiment was extended to investigate the asymmetry of reciprocity using both kind of gift. We have invited few of subjects (due to budget constraint) for second round and paid them originally announced wage. Results supported the asymmetry of reciprocity, a stronger negative behaviour was observed in monetary gift group. Discontinuing non-monetary gift also resulted into productivity loss, however, significantly less than cash gift group.

This paper contributes to existing literature in many ways. First of all it provides additional experimental evidence of reciprocal and social exchange theory which is mainly tested in lab environment, except Kube, *et al.* (2008). While there are many lab studies proving gift exchange mechanism, field evidence is not always convincing [Kube, *et al.* (2006, 2008); Gneezy and List (2006) and Henning-Schmidt, *et al.* (2009)].

Secondly, experiment also provides alternative explanation for use of non-monetary gifts. As discussed earlier, Kube, *et al.* (2008) attribute the efficiency of non-monetary incentives to kind intentions signalled by 'the gift' aspect of non-monetary gift. In addition to kind intentions, we also found greater pleasure and trophy value of non-monetary gift which yields higher utility gain from non monetary gift. Separability of non-monetary gift also inflates personal value attached to it. People do not evaluate assets collectively; they rather make separate mental accounts for each type of incentive. In such case "the neutral reference point for evaluating the cash bonus will be the employee's base salary, and will make the award more subject to the value-reducing effects of diminishing marginal utility" [Jeffery (2002)].

Thirdly, while there are many studies on asymmetry of reciprocal behaviour, we are not aware of studies comparing asymmetry of reciprocity using monetary and non-monetary gift. Our study has supported the asymmetry of reciprocity for both kinds of gifts. The patterns were however very different. Cash gift created stronger response to act of taking back the incentive, while positive reciprocity dominated in non-monetary gift. The explanation came within our data set that cash award is soon mixed with higher wage, while non-monetary gift is treated as 'the gift'. Intuitively, a wage cut should have stronger response than discontinued gift.

Finally, experiment also provided additional evidence for preference-decision conflict observed by Hsee, *et al.* (1999): the preference and labour supply decision for gifts were not consistent. Hsee, *et al*. (1999) attributed this to pseudo-value attached to money due to high fungibility in joint valuation. An additional explanation comes from Heyman and Ariely (2004) they argue that mixed market will resemble more to money market. Additional psychological features attached to non-monetary incentives that seem

working in non-monetary gift treatment may not be able to alter predicted utility of reward in joint evaluation

The remainder of this study is organised as follows. In Section 2, we describe our experimental methodology. In Section 3, we present our results and discussion. Section 4 gives the extension of experiment for negative reciprocity. Section 5 concludes the study.

2. THE EXPERIMENT

A set of 120 students were selected randomly from different universities through an advertisement displayed on notice boards.[2] Wage was announced as rupees 120 per hour in advertisement. The subjects were hired without any knowledge of being part of any experiment. There were total 179 calls from interested student of which a group of 120 students was selected randomly.[3]

The pool of selected subjects was randomly divided into four groups (i.e., control group, monetary gift treatment, non-monetary gift treatment and choice treatment groups) of thirty each. The students were informed to report on separate days. The experiment was organised in four hourly sessions with ten minutes break between each session.

They were assigned a task to grade multiple choice question (MCQ) answer sheets with given answer keys.[4] Each MCQ answer sheet had 100 questions with five possible answer options (A, B, C, D and E).The subjects have to match answer sheets with the answer key. Answer sheets were of three different types, coded as versions A, B and C along with their respective answer keys. The description of the questions were omitted, and set of answer sheets were mixed randomly just to minimise the chance of memorising answers with practice that can create a confounding factor. The subjects have to calculate the number of correct questions and write it on the session record sheet (Appendix A2). At the end of each session, recorded sheets were collected. The output is define as

$$Output = Total\ checked\ questions - mistakes$$[5]

The experiment was conducted at separate office in university. Few popular magazines (sports and fashion) and newspapers were deliberately placed in the room. A half hour paid training session was also conducted before experiment to make them familiar. Both monetary and non-monetary gifts were announced, immediately after the training session. The subjects were not monitored directly; however, coordinator was available for help if needed. Furthermore, all subjects interacted with the same project coordinators to eliminate experimenter effects.

The control group was paid the advertised wage i.e. 120 rupees per hour; in the monetary treatment group an unexpected 31 percent wage increase was announced after training session(additional 37.25 rupees per hour). In non-monetary group, New Year diaries (of worth rupees 150) were presented as gift along with their announced wage. For the choice treatment, after training session they were given a choice to select a diary

[2]We would like to thank Hisham Tariq, Muhammad Amjad Malik and their teams for providing their valuable research assistance during execution of field experiment and university administration for providing structural support, without them this was never possible.

[3]The list of all candidates was arranged in the order they called to show their willingness to participate in project. First 120 subjects were selected from randomly shuffled list of candidates.

[4]The task was not cognitive, so according to Pink (2008) it will respond to monetary incentives.

[5]Papers were later rechecked by especially designed software.

or additional 150 rupees apart from announced wage. For comparison purpose, the monetary worth of two gifts was kept same.

After experiment, all subjects were asked to fill the post experiment questionnaire. Question had information on gender, major, preference for monetary and non-monetary incentives and Big 5 personality test.

To analyse the asymmetry of reciprocity, last ten subjects in monetary and non-monetary gift groups were given option to participate in the same job for second day as well. All of them opted to continue for the next day. Before start of second day's session, wage for that day was announced as per originally advertised wage i.e. rupees 120 per hour. No one refused to complete the job, rest of the experimental procedure remained same.

3. RESULTS AND DISCUSSIONS

Main findings are

- Non-monetary incentives performed significantly better than monetary incentives, temporal dimension shows productivity gain remained significant over experiment.
- Despite stated higher preference for money, higher effort level was provided in non-monetary gift treatment. Productivity gain due to non-monetary gift is attributed to both kind intentions and greater trophy value of non-monetary gift.
- Higher job satisfaction was also reported by non-monetary gift group.
- Significant asymmetric behaviour was observed after discontinuing both monetary and non-monetary gift.
- The negative response to discontinuing non-monetary gift was significantly less than the negative response to discontinuing monetary increase in wage.

3.1. Non-monetary Gift Performed Well

In simple non-parametric analysis,[6] the gift exchange mechanism is working for both kinds of gifts at 10 percent. By introducing monetary gift, i.e., an unexpected 31 percent wage increase resulted in 5.5 percent productivity gain that is statistically significant at 10 percent. Many earlier studies also reported positive wage-effort relationship [Fehr and Falk (2008); Fehr, *et al.* (1993); Fehr and Tougareva (1995); Fehr and Falk (1999); Fehr, *et al.* (1998); Fehr, Gächter, and Kirchsteiger (1997)].

Non-monetary gift treatment resulted in significant 15 percent increase in average output with an equivalent 31 percent increased labour cost. Productivity gain due to non-monetary gift is, however, less than reported by Kube, *et al.* (2008); they stated a 31 percent increase in average output with 20 percent increase in labour cost. Perkin (1970) in preliminary study also showed the effectiveness of non-monetary incentives in family planning. Herzberg (2003) on other hand argued that fringe benefits and non-monetary perks do not motivate, spiraling wages on contrary motivate people to seek the next wage increase. Hansen (1980) compared the relative efficiency of monetary and non-monetary gifts (ball point pen) in mail response survey. The monetary incentive was more successful in generating a higher response rate in a shorter period of time. Author attributed this low response to not perceiving correct value of the gift.

[6]Using Mann-Whitney U test (also known as Wilcoxon rank-sum test), is non-parametric test used for two independent sample to test the equality of variable mean

Table 1

Details and Summary Statistics of All Groups

	Control Group	Monetary Gift		Non-monetary Gift		Choice Group
		Gift*	No Gift**	Gift*	No Gift**	
Gift Given	No	Yes	No	Yes	No	Yes
Day	1st	1st	2nd	1st	2nd	1st
Mean	633.75	666.98	451.75	730.83	581.5	675.25
St. Dev.	133.3	118.9	100.7	139.9	101	128.3
Median	625	670	475	735	580	680
Min	330	380	280	400	390	330
Max	940	1000	630	1120	760	1100

*Unexpected gift was given with wages. **: upon arrival on second day, subjects were told that they will be given their originally announced wage only (i.e., no gift will be given to them).

In choice treatment, only 4 (13 percent) students out of 30 chose non-monetary gift. In kind gift is very unlikely to match its recipient's preferences in joint valuation with cash. There was a significant 6.4 percent productivity gain compared to control group in choice treatment.

Choice treatment performed statistically equal to money gift and significantly less than non-monetary gift (Table2). Kube, *et al.* (2008) have tested choice treatment in separate lab session; more than 92 percent of subjects have chosen money.

Table 2

Comparison between Treatment Groups

	Choice	Monetary	Non-monetary
Control	Z=2.3 (0.020)**	z=1.8 (0.069)*	z=5.05 (0.000)***
Non-Monetary	Z=3.3 (0.001)***	z=3.6 (0.000)***	
Monetary	Z=0.5 (0.620)		

*** significant at 1 percent , **significant at 5 percent, and *significant at 10 percent level of significance.

3.1.1. *Discussion*

An explanation for the productivity differences are based on the theory presented by Heyman and Ariely (2004). Non-monetary gift is perceived more as gift and produce higher reciprocal behaviour. In social market, effort level is mainly derived through altruistic behaviour and social norms and level of reciprocity thus remains robust for different level of compensations. In money market reciprocity is supposed to be affected by magnitude of compensation i.e. increasing the monetary incentive will increase the magnitude of effort accordingly. However, Falk (2007) in his fundraising experiment found positive linear relationship between magnitude of non-monetary gift (post cards) and reciprocal behaviour (donation).

Kube, *et al.* (2008) attributed higher output in non-monetary gift to kind intentions signalled from using non-monetary gift as compared to monetary gift. Kind intentions from employers were also remained high for non-monetary gift in our post experimental questionnaire; differences are significant at 10 percent level.

Jeffery (2002), in his seminal work, argued non-monetary incentives have ability to address variety of psychological needs, so would have a deeper and long-term effect on motivation. Non-monetary incentives, due to high visibility, have greater trophy value so possess greater utility level. To test the argument, a trophy value index was calculated from set of questions (they will enjoy gift for long period of time, pride associated to gift and they are likely to tell their friend and family about their gift, for details see Appendix A4) by taking simple average of three ranks. Results showed significantly higher trophy value for non-monetary gift. Similarly gift perception for diary was significantly higher than money wage. Money on other hand quickly gets confused with high salary or payment, agents adjust their perception of wage and effect will die out. Assuming this true, subject should respond strongly to perceive wage cut than discontinuation of gift incentive. This argument has been tested and supported for asymmetry of reciprocal behaviour for both kinds of gift in Section 4.

Table 3

Mean Scores of Control Variables

	Control Group (1)	Monetary Gift (2)	Non-monetary Gift (3)	Choice Treatment (4)	p-value±
Enjoy Gift for Long Period	–	3.8	4.6	3.8	0.032**
Proud to Receive Gift	–	3.9	4.5	4.0	0.105
Tell Friend and family	–	3.9	4.4	4.1	0.234
Trophy Value Index	–	3.9	4.5	4.0	0.009***
Gift Perception	–	3.7	4.4	4.3	0.073*
Payment Perception	–	4.0	4.0	4.5	0.829
Fairness of contract	4.5	4.1	4.2	3.7	0.588
Risk Behaviour	4.7	4.0	3.9	4.3	0.680
Job Satisfaction	4.3	4.5	5.1	4.4	0.003**
Kindness from Employer	4.9	3.9	4.6	4.1	0.072*

± p-value of difference of ranks among monetary and non-monetary gift groups only Columns 1 to 4 give the average ranks given to given variables.

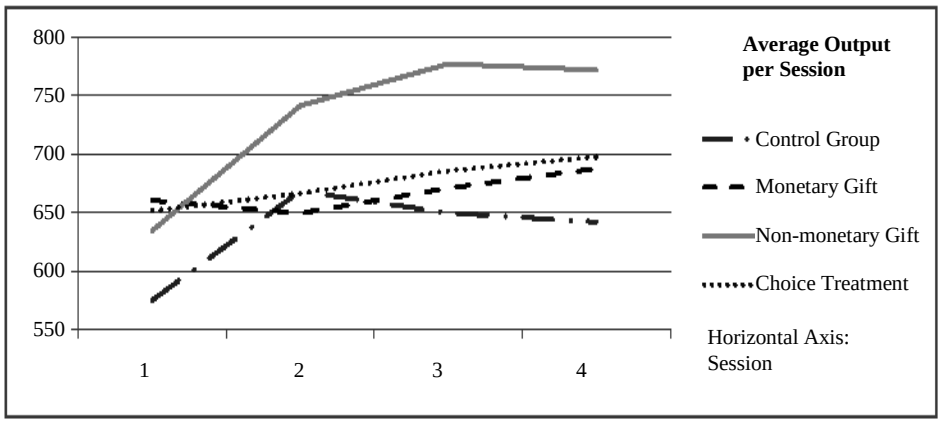


Fig. 1. Average Output Per Session

The regression results for the data are given in Table 4. The dependent variable is the number of correctly checked questions, while treatment effects are measured using treatment dummies for these groups in comparison to control group. Column 1 gives the OLS estimates using aggregated individual level output, results are in line with Table 2. Column 2 to 5 gives robustness of treatment effect using control variables. The model is extended by incorporating temporal dimension, and interaction of time with treatments. The list of control variables is divided into two categories, ability based and socio-economic variables. Job ability or job behaviour characteristics are measured using Big Five Personality test—a famous test used by firm for hiring. The test scores five personality traits associated with work behaviours, i.e., openness, conscientiousness, extraversion, agreeableness and neuroticism. Socio-emotional variables included the data on age, major subject in university, previous wage (if any), monetary preference and gender.

Table 4

Robustness Analysis

Variable	(a)	(1)	(2)	(3)	(4)
Constant	2535	588.2	756.8	670.8	518.3
	(64.52)***	(28.56)***	(73.53)***	(85.54)***	(40.21)***
Monetary Treatment	132.93	53	48.03	45.06	47.5
	(92.0)	(39.0)	(38.4)	(38.8)	–39.24
Non-monetary Treatment	388.3	31	27.9	27.6	29.6
	(91.25)***	(42.0)	(41.7)	(41.1)	–41.1
Choice Treatment	166	48	42.1	40.9	45.3
	(91.25)*	(38.0)	(38.1)	(38.5)	–38.24
Time	–	18.2	18.2	18.2	18.2
	–	(9.44)*	(9.11)**	(9.04)*	(9.29)*
Monetary*Time	–	–7.9	–7.9	–7.9	–7.9
	–	(13.0)	(12.8)	(13.0)	–13.01
Non-monetary*Time	–	26.4	26.4	26.4	26.4
	–	(13.74)*	(13.40)**	(13.18)**	(13.38)**
Choice*Time	–	–2.6	–2.6	–2.6	–2.6
	–	(14.2)	(14.0)	(14.1)	–14.13
Agreeableness	–	–	–	0.6	0.7
	–	–	–	(0.4)	(0.34)*
Socio-Economic	No	No	Yes	Yes	No
Ability	No	No	No	Yes	Yes
Wald Test +					
		0.54	0.50	0.45	0.44
Monetary vs. Non-monetary		(0.588)	(0.616)	(0.654)	(0.660)
		0.14	0.16	0.06	0.11
Monetary vs. Choice		(0.890)	(0.870)	(0.953)	(0.912)
		0.43	0.36	0.40	0.34
Non-monetary vs. Choice		(0.669)	(0.718)	(0.687)	(0.731)

We have estimated same equations Column (2) to (5) through panel GLS with random effect and Got similar results, so decided to report only OLS results. Socioeconomic variables include subject major, previous wage and age, money preferences and gender, while ability includes five personality traits openness, conscientiousness, extraversion, agreeableness and neuroticism. Values given are coefficients, while standard errors are given in parenthesis. +: values are Wald statistics with p-value in parenthesis. ***Significant at 1 percent , **significant at 5 percent, and *significant at 10 percent level of significance.

Despite a deliberate attempt to minimise learning effect (average output is increasing with time), learning remained significant during experiment. Similar patterns were also observed in Kube, *et al.* (2006, 2008), while positive impact of wage increases fades over time in Gneezy and List (2006). Data analysis showed that non-monetary gift resulted into significant adaptation behaviour over time even after controlling for personality traits related to work behaviour and other socio-economic variables. This increase significantly improved over the period of experiment (column 1 to 4), supporting the general perception that social relationship take time to built and improve over time.

After controlling for variables, the treatment effect of both monetary and choice treatment is insignificant over time. Gneezy and List (2006) have found a transient effect of gift on long run outcomes. Kube, *et al.* (2006) also showed ineffectiveness of monetary gift in the long run. Transactions in social exchange via non-monetary gift produced long term and consistent effect on the response [Heyman and Ariely (2004)].

Assuming that after controlling for treatments and time, the effort level provided by the subject is totally due to reciprocity, regressing output on the personal traits shown by the subjects we find personality trait "Agreeableness" insignificant at traditional significance levels, with hetero-corrected standard errors. High agreeableness score indicate cooperative and compassionate personality that tends to reciprocate good behaviour. Many earlier studies have found agreeableness significantly related to Gift exchange mechanism [Ben-Ner, *et al*. (2006); Englmaier and Leider (2010)].

3.2. High Preference for Money

Traditional utility theory is based on preferences, which are not observable. Under the influence of positivist philosophy, an attempt was made to reduce all theoretical concepts to observable ones. Samuelson (1938) introduced the idea of revealed preferences (RP) as an observable counterpart to preference. An agent is offered a choice between A and B; if she chooses A, then she has revealed a preference for A over B. This transforms an unobservable preference to an observable choice. There is a lot of discussion about whether or not choices do reveal preference in this fashion. See Hausman (2000) or Wong (2006) for a discussion and a critique.

In this paper, we differentiate between three variants of preference: True underlying preferences, stated preferences and observed preferences. True underlying preferences, in this paper context, whether the person feels happier when given money or whether he feels happier when given gift, are unobservable. However we can attempt to measure this by looking at responses to the two treatments, money or gift. If person increases his effort more when given gift, then we can say that he was motivated more by the gift, and therefore infer that he liked it more. The stated preferences are when we asked them to report/state their preferences like we did in our post experimental questionnaire, whether you would prefer money to gift. These preferences are made in hypothetical situations. Lastly the observed preferences are the actual decisions in the real world situations, like most of subjects in our experiment actually chose money gift. In both the real world and hypothetical settings, the researcher does not have information on all the factors that influence an individual's choice that determine the true underlying preferences.

Since the observed and stated preferences choice settings are quite different, there is no reason to believe that the variance of the unobserved factors in the RP setting will be identical to that of the variance of unobserved factors in the SP setting [Ben-Akiva and Morikawa (1990)]. To test the argument, our questionnaire asked subjects to rank (1 to 5 scores) their preference for money and a set of non-cash incentives for their motivational ability at work. To test the stability of stated and observed preferences for this experiment, we first defined a dummy for monetary preference on the basis of preference scores given in questionnaire. The difference between two scores is calculated as d, money preference dummy is defined as

$$m = \begin{cases} 1 & for\, d > 0 \\ 0 & otherwise \end{cases}$$

The proportion of subjects with strictly money preference to total subjects was then tested for its consistency in with observed preference recorded in choice treatment (i.e. 13 percent chose money gift over non-monetary gift).

Table 5

Test of Preference Proportions

	Proportion
Stated Monetary Preference	0.70
Observed Monetary Preferences	0.87
Z Score= 2.3 (Fisher Exact Test: p-value= 0.068)*	

*** Significant at 1 percent, **significant at 5 percent, and *significant at 10 percent level of significance.

Testing for equality of proportion of subjects who strictly preferred money in questionnaire versus observed choice, we failed to reject any significant differences between the two proportions at 10 percent level of significance (Fisher exact test: p-value = 0.068). However, higher stated and observed preference for money is not translated into higher output in the monetary gift group. The preference-labour supply conflict in experiment can be attributed to mismatch of preference, fungibility of money is likely to create higher preference for money [Hsee, *et al*. (1999)]. Hsee (1999) argues that this prediction-decision inconsistency is caused by the presence of a "pseudo-value attribute"—an attribute which provides information about "rational" behaviour—which can cause people to choose their less preferred option. In joint valuation money market mechanism surmount the social norms and non-monetary gift loses its significance as social exchange relationship [Heyman and Ariely (2004); Ariely (2008)].

While we have showed the insignificant differences among stated and observed preferences, the main finding is that the true response to gift was significantly higher for non-monetary gift.

4. ASYMMETRY OF RECIPROCITY

During recessionary periods, wage cuts and discontinuation of incentive is common. While, workers are assumed to reciprocate higher wage levels from firms by increasing their effort (positive reciprocity) they also decrease their effort (negative

reciprocity), in retaliation to lower wage. Asymmetry of reciprocity mean productivity gain due to x percent wage increase may not equal to a productivity loss due to similar x percent wage cut. Studies have shown that workers respond strongly to wage cut than wage increases [Campbell and Kamlani (1997)]. Some experimental studies have also supported the hypothesis of asymmetry reciprocity where incentives framed negatively (as fines and wage reductions) result in stronger response than positively framed incentives [Hannan, *et al.* (2005); Fehr and Falk (2002); Kube, *et al.* (2006)].

To test the argument that non-monetary gift is perceived as "Gift". while monetary gift is quickly mixed with wage increase, we introduced small manoeuvre within our experimental setup to take an additional observation of asymmetric behaviour through monetary and non-monetary gifts separately. After completion of experimental session, we asked last ten subjects[7] in two gift treatments i.e., monetary and non-monetary were given choice to participate in project for the second day as well. Discontinuation of gift resulted into significant decrease in the output of the same subjects significantly.

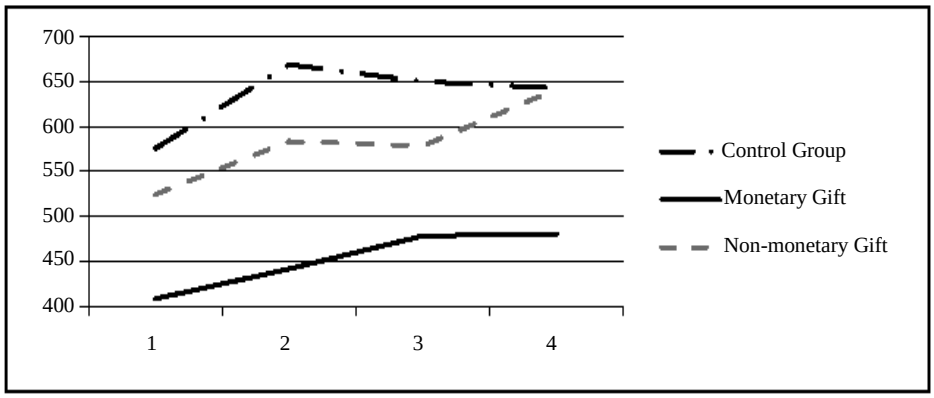


Fig. 2. Sessions with No Gift Graphed with Control Group

The summary statistics for the second day's output is given in Table 1. In monetary treatment, the positive reciprocal behaviour resulted into an increase of 5.5 percent; however, discontinuation resulted in 28.7 percent decrease in productivity. For non-monetary gift the productivity gain due to positive reciprocity (15 percent) is higher than negative reciprocal behaviour (8.3 percent). The monetary gift resulted in stronger negative behaviour compared to non-monetary gift when discontinued. Significant differences were noted when both kinds of gifts were discontinued, the comparison is given in Table 6. This supports the common perception that once introduced, its hard to roll back the cash based incentive programmes.

Fehr and Gachter (2000) and Masclet, *et al.* (2003) worked on monetary and non-monetary punishments respectively; both studies resulted in same conclusion that punishment increases average contributions sharply. The existence of the "non-monetary" punishment, however, increases the average level of contributions and earnings less than the monetary punishment. Herzberg (2003) also suggested that spiraling wages motivate people to seek the next wage increase, if rising wages won't motivate, reducing them might work.

[7]Due to budget constraint, only ten subjects were tested for asymmetry of reciprocity.

Table 6

Comparison of Average Treatment Effect for Sessions with No-gift[8]

	Monetary	Non-monetary
Control	Z=-6.7 (0.000)***	Z=-2.3 (0.024)**
Non-monetary	Z=-4.7 (0.000)***	

*** Significant at 1 percent , **significant at 5 percent, and *significant at 10 percent level of significance.

4.1. Potential Explanation

There are many potential explanations given for asymmetry of reciprocity. First, the Loss aversion, according to Campbell and Kamlani (1997) people tend to value loss more than equivalent gain so effort provided by the labour is more sensitive to wage cut as compare to wage increase. In another experimental study on hot response game, Offerman (2002) showed that people react strongly to intentional hurtful choice than to intentional helpful choice. They contributed this asymmetry of response to self-serving bias. Intentionally helpful act are in line with positive self image of themselves, while intentional hurtful make sharp contrast with positive self image so results and produce strong behaviour.

We can explain the differences in asymmetric behaviour by two gifts, based on idea on mental accounting. People place all their assets in separate mental accounts, for example investment income, home appreciation and precious household item holding. Cash incentive since earned along with employment income, it is likely that subject combine this with rest of employment income. If this occurs, the neutral reference point for evaluating the cash bonus will be the employee's base salary, and will make the award more subject to the value-reducing effects of diminishing marginal utility [Kahneman and Tversky (1979), copied from Jeffery (2002)]. Cash bonuses lack separability as they go into the basic salary mental account; participants often continue to view this money as an increase in total compensation, because it is cognitively aggregated with salary. The value of the cash award for performance does not stand out anymore. Companies can counter this through a ceremony and the like (to commemorate the performance); however,

Non-cash incentives, due to separability, placed in to more specific separate mental accounts (e.g., Travel, Entertainment), etc., and not aggregated with salary account so values separately from basic salary [Jeffery (2002)]. Higher gift perception ranks for non-monetary incentive in our post experiment questionnaire support this argument. A discontinued cash program is perceived as a compensation benefit reduction rather than the end of an incentive program. This becomes even more difficult in a low paid environment.[9] Finally, the nonmonetary gift is usually taken as "gift", where cash incentives take form of rights instead of recognition [Flanagan (2006)].

5. CONCLUSION

Empirical evidence shows that wages in labour markets do not always clear the market: in many cases, firms pay a higher than market-clearing wage, resulting in higher labour supply and involuntary unemployment. A substantial amount of experimental literature favours positive relation among wages and effort, confirming efficiency enhancing reciprocal behaviour [Fehr, *et al.* (1993, 1997); Hannan, *et al.* (2002); Brown,

[8]By Mann-Whitney U-test.

[9]Arnold Light, President of the Light Group at http://www.incentivesmotivate.com/art_cash_vs_ merchandise.shtml.

et al. (2004)]. Social exchange theory came up with investigation of incentives as monetary and non-monetary incentives [Heyman and Ariely (2004)].

Ariely (2008). According to social exchange theory, non-monetary gift facilitate social relationships, signal kind intentions, and hence results in higher reciprocal behaviour. There are only few studies to test the ability to extract reciprocal behaviour in real field settings. One exception is Kube, *et al.* (2008), they have supported social exchange phenomenon in field settings. Our study not only proved the existence of social exchange theory in field but provided an alternative explanation for it as well. Results of experiment strongly support the prediction of social exchange theory and productivity gain due to non-monetary gift was significantly higher than monetary incentives.

Kube, *et al.* (2008) attributed high performance to perception of gift; non-monetary gift is considered as the "gift", and so gives a signal of more kind intentions. Our experiment provided evidence for separability property of non-monetary incentives; tangible non-monetary incentives segregated from the salary carry utility beyond the pure consumption value of incentive. We have also calculated trophy value indicator and results supported the argument by Jeffery (2002). A non-monetary gift on other hand may sit in the living room for years reminding the gift. Employee will evaluate the utility of tangible gift through pleasurable experience he will get from it. Jeffrey and Shaffer (2007) suggested that non-monetary incentives can produce better and cost efficient results as compared to monetary results. Employee may say they want cash but it isn't the most effective incentive always. Tangible rewards are both extrinsic and intrinsic motivators; they have a strong emotional appeal to participants' personal wants and interests. They also provide lasting satisfaction and long-term performance improvement. Cash incentives can produce short term incentives, but have little connection with sustained long run performance improvement.

Despite clean evidence of social exchange mechanism by non-monetary incentive, a higher stated and observed preference for money raised interesting puzzle. Hsee, *et al.* (1999) explained a similar prediction-decision inconsistency by presence of "pseudo-value attribute"—a feature which provides information about "rational" behaviour attaching pseudo value to their less preferred option in joint evaluation. In isolation, higher job satisfaction kind intentions and trophy value rank were given to non-monetary incentive, supporting the argument that monetary gift due to separability evaluated separately from salary.

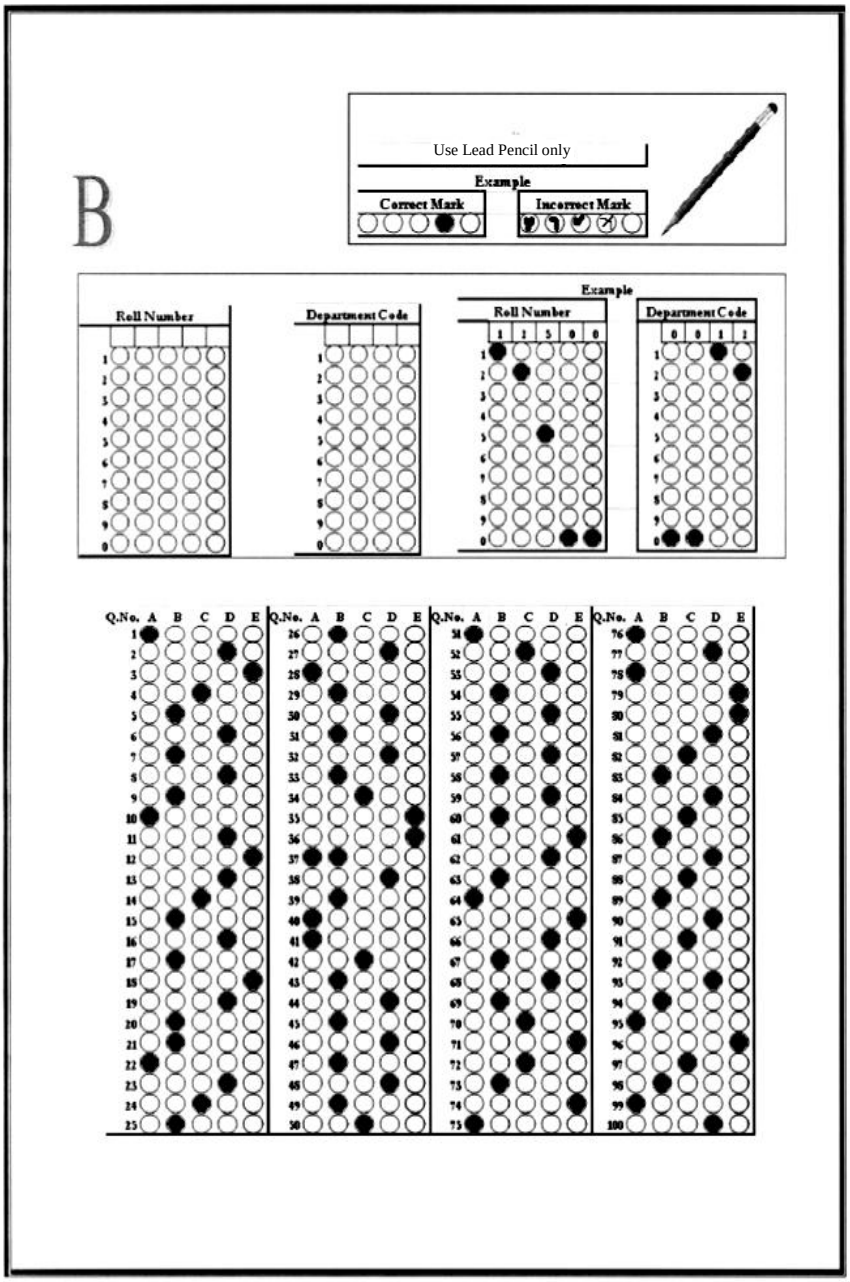
Most interesting finding is significant differences in the asymmetry between both monetary and non-monetary gift. Result show negative reciprocity is stronger for money wage increase compared to non-monetary gift that can be explained by mental accounting of provided incentives.

In low incentive environment where people are unable to fulfil their basic needs, non-monetary incentive may not be as efficient results as predicted by social exchange theory. Similarly, during sluggish economic conditions, the use of non-monetary incentive in combination of monetary incentives may produce cost efficient results. Interactions in labour market are long term and have ability to incorporate social exchange very well. Cash incentives are not the only option, firms may use many alternative tool that can be used to facilitate socio-emotional relationship like more attention, care and appreciating their efforts. In more complicated situations in real world, it worth noting that exchanges in real lift may be very complicated and may not product result strictly similar to such controlled experiment. Workers might respond in many unique directions like sticking to firms in bad times, decide not to quit even if more attractive outside options are present.

Appendices

Appendix A1

Sample Answer Key



Appendix A2

Session Record Sheet

Session No……..

Please enter the roll numbers of each answer sheet after grading it.

Sr. No.	Roll No.					Obtained Marks
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

Signature:…….

Name:---------- Assigned Code:----------

Date: ----------

Appendix A3

Picture of Diary

Appendix A4

Post Experiment Questionnaire

Name…….. Assigned Code……
Registration No. …….
Department: ……
University
Contact No.
Age ……Years
Gender: Male Female

Previous Wage (if any)…….Rupees/hour, Not employed previously

Section A:

1……is talkative

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2……tend to find faults with others

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

3……does a thorough job

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

4……is depressed, blue

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

5……is original, comes up with new ideas

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

6……is reserved

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

7……is helpful

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

8……can be somewhat careless

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

9……is relaxed, handles stress well

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

10……is curious about many different things

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

11……is full of energy

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

12……starts quarrels with others

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

13……is reliable worker

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

14……can be tense

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

15……is ingenuous, a deep thinker

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

16……generates a lot of enthusiasm

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

17……has a forgiving nature

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

18……tends to be disorganised

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

19……worries a lot

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

20……has an active imagination

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

21……tends to be quite

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

22……is generally trusting

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

23……tends to be lazy

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

24……is emotionally stable, not easily upset

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

25……is inventive

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

26……has an assertive personality

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

27……can be cold and aloof

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

28……preserves until the task is finished

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

29……can be moody

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

30……values artistic, aesthetic experiences

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

31……is something shy, inhibited

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

32……is considerate and kind to almost everyone

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

33……does things efficiently

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

34……remains calm in tense situations

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

35……prefers work that is routine

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

36……is outgoing and sociable

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

37……is sometimes rude to others

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

38……makes plans and through with them

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

39……gets nervous easily

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

40……likes to reflect, play with ideas

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

41……has few artistic interests

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

42……likes to cooperation with others

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

43……is easily distracted

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

44……is sophisticated in arts, music, or literature

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

45……extraverted, enthusiastic

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

46……critical quarrelsome

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

47……dependable, self-disciplined

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

48……Anxious, easily upset

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

49……open to new experiences, complex

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

50……reserved, quiet

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

51……sympathetic, warm

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

52……disorganised, careless

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

53……calm and emotionally stable

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

54……conventional and uncreative

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Section B

Please rate the following statements on a scale from 1 to 7, where 1 means "fully disagree" and 7 means "fully agree".

1. … will enjoy diary/money for long period of time

1	2	3	4	5	6	7

2. … am proud to receive diary/money

1	2	3	4	5	6	7

3. … will tell friends and family about diary/money

1	2	3	4	5	6	7

4. … perceived as gift

1	2	3	4	5	6	7

5. … perceived as payment

1	2	3	4	5	6	7

6. … risk lover

1	2	3	4	5	6	7

7. … am satisfied with this job

1	2	3	4	5	6	7

8. … treated kindly from employer

1	2	3	4	5	6	7

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Urbanisation and Crime: A Case Study of Pakistan

HAFIZ HANZLA JALIL and MUHAMMAD MAZHAR IQBAL

1. INTRODUCTION

Crime is an activity which is against the law and the fact that the linkage between criminal activities and the socio-economic development of the society is undeniable. Moreover, the relationship between crime and evolution of mankind may also be considered a historical one as Cain (first son of Adam and Eve) committed first crime when he murdered his brother Able because of jealousy. Due to the complex nature of the subject of crime, for example, regarding its causes and consequences, various academic disciplines such as criminology, sociology, geography, psychology and demography study it from their own perspective. A relatively new emerging field, however, is the economics of crime which tries to identify the socio-economic causes and consequences of criminal activities in a society.

Marshall and Clark (1952) wrote: "A crime is any act or omission prohibited by public law for the protection of the public and punishable by state in a judicial proceeding in its own name". Similarly Tappan (1960) defined that "A crime is an instrumental act or omission in violation of criminal law, committed without justification and sanctioned by the state as felony or misdemeanour". Though in case of criminal activity the net social benefits are negative but there are some advantages also like new jobs for crime prevention. Using cost and benefit analysis many theories have explained the trends in criminal activities. For the criminal person the cost is punishment plus time which he has to spend in custody. On the other hand, the cost for the victims may include security expenses and the loss of money etc. In a strictly economic sense, a criminal is taken as a rational person as he compares the costs and benefits of committing a crime [Becker (1968)].

As urbanisation is the process of growth in urban areas. Industrialisation, specialisation, and economic development are related to the theories of urbanisation. A basic feature of urbanisation is the shifting in employment from rural to urban or industrial sector. In other words, urbanisation is an indicator of industrial development in the economy. Labour market pooling, trade of goods and services, knowledge spillover, high level of income and economic relations are the basic pillars of urbanisation. This

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type of development is helpful for employment creation, poverty reduction and planned local business development in the urban regions. Theories suggest that urbanisation is good for promoting growth of industries and development in the economy. The other face of this urbanisation may be the encouragement of crimes as well, since, crimes normally occur in large cities and in urbanised areas [Krivo and Peterson (1996)]. In rural areas, due to lower population density, criminal persons have less chance of hiding themselves because people know each other. The opposite is true for urban areas. The main facts of crimes in urban areas are the fewer chances of arrest and recognition [Glaeser and Sacerdote (1996)]. Therefore, it is argued that as urbanisation increases so does crime [Galvin (2002); Gaviria (2002)]. Hence, one may argue that more urbanisation is an indicator of higher crimes. This is a common observation for many countries in the world. Through out the world the rate of expansion of urban population is on the rise because of substantial industrial development. As Gumus (2004) argued that in 1950, 30 percent of world population was living in urban areas where as, in 2000, this value reached 47 percent. It is estimated that this figure will reach to 60 percent in 2030. In Pakistan there is rapid increase in crimes like the other countries of the world. It may be the effect of urbanisation, and some other economic and socio economic factors.

There has not been undertaken a systematic comprehensive study for Pakistan on the above mentioned issue. Several explanations have been provided on crime in the literature but none of these provide a sound analysis of linkage between urbanisation and crime. Therefore, there is dire need to fill this gap in the literature by conducting an empirical investigation on the relationship between crime and urbanisation. This provides the motivation for the underlying study. More specifically, the objective of this study is to find the relationship between crimes and urbanisation and some other macroeconomic factors such as unemployment, and inflation. The question is what will be the impact on crimes when large numbers of people settle down in a single city? Using time series data for Pakistan the study covers the period of 1963-2008.

Using Johansen cointegration analysis, the results indicate that there is a positive association between urbanisation and crime in Pakistan. Moreover, unemployment, inflation, and income inequality are also important determinants of crimes. Education, on the other hand, is found to have a negative effect on criminal activities. For the purpose of robustness of results, three models are estimated using various variables. This also takes care off for the multicolinearity problem.

Rest of the study proceeds as follows; Section II briefly reviews the related literature on crimes and their determinants. Section III discusses the theoretical model and the econometric methodology used in the study. Detail of variables, results and interpretations are presented in Section IV. Section V concludes the study.

2. LITERATURE REVIEW

The economic foundations of criminal justice was developed by Beccaria (1767) and another source of interest in economics of crimes is emerged from the famous novel "Crime and Punishment" by Dostoevsky (1866).

The role of income on the criminal activities is observed by Fleisher (1966). The author argued that income has two possible effects on criminal behaviour. An expected demand side effect is positive and expected supply side effect is negative. Demand side

effect is that when people have higher incomes then there is decrease in criminal behaviour. The supply side effect is that when there is more income in the economy and people want to get that money through criminal behaviour. He estimated that demand side effect is more than the supply side effect that is if there is 1 percent increase in income then the delinquency decreases by 2.5 percent.

Recent theoretical foundations of crime link back to the work of Becker (1968) and Ehrlich (1973). The main contribution on economics of crime is normally related to the work of Becker (1968). He presented a model and argued that a person will commit crime if the expected utility of crime is more than the utility he could get from consuming his time in some other legal activities. Every criminal faces physical and psychological benefits from crime and also costs in terms of law-enforcement. There are two main determinants of costs. One is probability of being caught and the other is the punishment faced if caught. He worked mostly on shaping policies related to the cost of illegal behaviour. Similarly there are also some other macroeconomic factors which affects crimes. Out of those factors unemployment is at number one. The positive association between crimes and unemployment is observed by Ehrlich (1973). He mentioned that unemployment is an indicator of income opportunities from legal sector. So if there is an increase in unemployment rate then the involvement of persons in legal sector also decreases.

The main difference between above two studies was that Becker considers opportunity costs as well as explicit costs and benefits in a society while Ehrlich investigates employment as an indicator of availability of income in a society. Crime rate is high at younger age. In the age of eighteen almost 35 percent people were arrested in Philadelphia, Wolfgang (1972). Similarly Tillman (1987) reported that one third of all men were arrested in California at least once between the age of 18 and 30. The hypothesis of deterrent measures on criminal activities was tested by Mathur (1978) and Witte (1980). Mathur considered two time periods, 1960 and 1970 and found inverse relationship between the certainty and the severity of punishment with all types of crimes because of rationality of the people. Similarly Witte also found negative relationship but he investigated that the effect of certainty of punishment is more as compare to severity. Myers (1983) took random sample of offenders released by federal prisons in 1972. He studied that punishment is not more effective tool for preventing crime. It is better to create opportunities for employment and this will work for reduction in crime.

Further the empirical investigation between crimes and its determinants in urban areas is done by Gumus (2004). He used two types of crime in large US cities. First he took total numbers of property crimes and second he used serious crimes like murder, forcible rape and robbery as a dependent variable. Using cross sectional data of large US cities he found that urbanisation and income inequality are important factors of urban crime. The main facts of crimes in urban areas are the less possibility of arrest and the less probability of recognition and families are less intact in urban areas [Glaeser and Sacerdote (1996)]. Another effect on crimes is observed by Krivo and Peterson (1996). Considering 177 regions, authors estimated the separate models of property and violent crimes and argued that when the neighbours of urban areas are poors then there is more chance of crimes in urban areas.

In Pakistan urbanisation is a serious matter because in 2030 urban population will rise by 140 percent almost [Haider (2006)]. The author argued that this type of fast growth in urbanisation will create unemployment in youth and change the mind of people towards crimes. Urbanisation is not bad in itself because people have the right to improve their living standard and find suitable jobs which is more in urban areas.

3. THEORETICAL FRAMEWORK AND ECONOMETRIC METHODOLOGY

In economic geography, it is argued that if there are economies of scale then those economic regions with more production become more profitable and attract more production. Concentration of production should be focused in some regions or cities instead of spreading it. This will create high income opportunities in those regions or cities and make them more densely populated. More than hundred years ago Marshall (1920) argued that there are three reasons why a firm, situated in a cluster, is more efficient than a firm situated at a secluded place. These reasons are basically the sources of external economies. First reason is that cluster supports the specialised suppliers. For example, when there is need for specialised equipment in the case of new production, this type of clusters can be very beneficial. Second is that cluster of firms can create pooled market for highly skilled labours. The third one is the knowledge spillover effect. With this effect, knowledge is available for other industries also and those industries can get benefit in production. Some studies identified theoretical models which described the conditions of a person when he will commit crime as his objective is the maximisation of utility). Keeping in mind the aforementioned debate and considering Coomer (2003), Gumus (2004), and Gillani, *et al.* (2009) we build a model in which the following determinants of crimes are taken.

Crime = *f* (Urbanisation, Unemployment, Inflation, inequality, education)

In the above model both pure economic and socioeconomic determinants of crimes are considered. More importantly, this model also considers a demographic variable (urbanisation) which has not been considered for Pakistan in the earlier studies. These variables are justified on basis of theory as well as their extensive use in empirical research in the literature on crimes. Most empirical studies concluded that these variables are important determinants of criminal activities in the respective regions of studies. The first variable is urbanisation. Unplanned urbanisation may contribute to crime, and since urbanisation in Pakistan is unplanned [Arif (2003)]. The second explanatory variable is unemployment and it is observed that if the person is unemployed then he must adopt some other ways to get money. Moreover, for an unemployed person, the opportunity cost of committing a crime is also low, which may force him to be involved in illegal activities. Thus, unemployment may have positive effect on crimes [Ehrlich (1973); Hagan's (1993); Thornberry (1984); and Wong (1995)]. The second economic variable is inflation and it is obtain by taking the growth of CPI. Increase in prices normally decreases the real income of individuals. In the light above justification it may be easily be concluded that inflation is important determinant of crimes and its possible effect is also positive [Coomer (2003); Gillani, *et al.* (2009), and Omotor (2009)]. The next two variables are socio economic. First one is the income inequality and the other one is

education. The income inequality is also an important factor which may affects crimes. Gumus (2004) argued that if inequality is more, then people with low income want to adopt the living standard of high income people. It is impossible for low income group to follow the higher living standard with legal work. The last variable is education. Education can reduce the crimes through wages. Basically education is the source for raising wage of a person. Lochner (2007) argued that education has two possible ways to reduce crimes. First way is that good education increases the opportunity cost of crimes because criminal needs time for committing crime and that time cannot be used in other productive purposes like legal work because high education confirms the better job opportunities in legal sector. Second is the time wastage of criminal for being in custody or in jail. This cost is very high for criminal because he can raise his income by spending his time in other ways.

3.1. Econometric Methodology

The underlying section discusses the econometric methodology used in the study. It is the Johansen Cointegration technique that started by Engel and Granger (1987). It was further advanced by Stock and Watson (1988), Johansen (1988) and Johansen and Juselius (1990). The purpose of using this technique is to find cointegration among stationary time series. All variables are non stationary at level but stationary at first difference. It means that variables can be cointegrated. The stationary linear combination is called the cointegrating equation and interpreted as a long run relationship among the variables. For investigating long run relationship among the variables we apply the most reliable Johansen Maximum Likelihood (ML) approach for the following equation.

$$Crimes = \beta_0 + \beta_1 Urbanization + \beta_2 Unemployment + \beta_3 Inflation + \beta_2 IncomeInequality + \beta_3 Education$$

3.2. Johansen Cointegration Technique

Basically two types of statistics (trace statistics and maximum eigenvalue) are used for checking cointegration. The explanation of these statistics is given below.

Johansen methodology starts from vector autoregression (VAR) and can be writes as

$$\Delta Y_t = A_o + \Pi Y_{t-p} + \sum_{j=1}^{p-1} A_j \Delta Y_{t-1} + \varepsilon_t$$

Let Y_t be vector of variables with sample t where Y_t follow the I(1) procedure. In above equation Y_t and Y_{t-1} are integrated at I(1). The long run stable association between Y_t is determine by the ranks of Π which is r and is zero. In this situation above equation slice to VAR model of pth order. So conclusion is that when variables are stationary at level then there is no cointegrating relation between them. If this the case like $0 < r <$ n then there are nYr matrices of $\delta\omega$ and now we can write

$$\prod = \delta\omega'$$

Where δ and ω normally shows the power cointegration relationship. Further $\omega' Y_t$ is I(0), and Y_t is I (I). In this case, (A0, A1,….., Ap-1, Π) is estimated through ML method

and two steps approach is adopted for the estimation of the parameters. Initially, the process starts to regress ΔY_t on ΔY_{t-1}, ΔY_{t-2},…… ΔY_{t-p+1} and obtain the residuals $\hat{v}_t$. Second step is to regress Y_{t-1} on ΔY_{t-1}, ΔY_{t-2},…… ΔY_{t-p+1} for the residuals $\hat{\varepsilon}_t$. With the help of these residuals variance- covariance matrix is estimated.

$$\sum\nolimits_{vv}^{\wedge} = \left[\frac{1}{T}\right]\sum_{t=1}^{T}\hat{v}_t\hat{v}_t'$$

$$\sum\nolimits_{\varepsilon\varepsilon}^{\wedge} = \left[\frac{1}{T}\right]\sum_{t=1}^{T}\varepsilon_t\hat{\varepsilon}_t'$$

$$\sum\nolimits_{v\varepsilon}^{\wedge} = \left[\frac{1}{T}\right]\sum_{t=1}^{T}v_t\hat{\varepsilon}_t'$$

Now the ML estimator 'ω' can be obtained by solving:

$$\left|\eta\sum\nolimits_{\varepsilon\varepsilon}^{\wedge} - \sum\nolimits_{\varepsilon v}^{\wedge} INV(\sum\nolimits_{vv}^{\wedge})\sum\nolimits_{v\varepsilon}^{\wedge}\right| = 0$$

With the Eigen-values $\hat{\lambda}_1 > \hat{\lambda}_2 > \hat{\lambda}_3 > \ldots\ldots\ldots > \hat{\lambda}n$ the normalised cointegrating vectors are $\hat{\omega} = (\hat{\omega}_1, \hat{\omega}_2, \ldots..\hat{\omega}_n)$, such that $\hat{\omega}'\sum\nolimits_{\varepsilon\varepsilon}^{\wedge}\hat{\omega} = I$. Further one can estimate the null hypothesis that $r = h$, $0 \leq h < n$ adjacent to another one of $r = n$ by obtaining the following statistics as given below:

λ trace = $L_A - L_0$

Where,

$$L_0 = -\left(\frac{T_n}{2}\right)\log(2\prod) - \left|\frac{T_n}{2}\right| - \left(\frac{T}{2}\right)\log\left|\sum\nolimits_{vv}^{\wedge}\right| - \left(\frac{T}{2}\right)\sum_{j=1}^{h}\log(1-\hat{\lambda}_t)$$

And

$$L_A = -\left(\frac{T_n}{2}\right)\log(2\prod) - \left|\frac{T_n}{2}\right| - \left(\frac{T}{2}\right)\log\left|\sum\nolimits_{vv}^{\wedge}\right| - \left(\frac{T}{2}\right)\sum_{j=1}^{n}\log(1-\lambda_t)$$

Hence

$$L_A - L_0 = -\left(\frac{T}{2}\right)\sum_{j=1+h}^{h}\log(1-\hat{\lambda}_t)$$

$$2(L_A - L_0) = -T\sum_{j=r+1}^{h}\log(1-\hat{\lambda}_t)$$

Where $\hat{\lambda}_{t+1}, \ldots..\hat{\lambda}_p$ are the calculated *p-r* smallest Eigen-values. The null hypothesis can be inspected which is that *r* is maximum cointegrating vector between variables. Simply, it is said that it is the number of vectors that is less than or equal to *r*, where *r* is 0, 1, or 2, and onward. Similarly like the upper case the null hypothesis will be examined against the alternative one. So the η max statistics is give below:

$$\lambda_{trace}(r) = -T \sum_{j=r+1}^{h} \log(1-\hat{\lambda}_j)$$

$$\lambda_{\max}(r, r+1) = -T \sum_{j=r+1}^{h} \log(1-\hat{\lambda}_{r+1})$$

The r is null hypothesis while r +1 is an alternative theory of cointegrating vectors. Consequently, hypothesis of $r = 0$ is examined against the alternative supposition of $r = 1$, $r = 1$ against the alternative $r = 2$, and onward. The next step is to decide the lag length so for this objective AIC and SBC are two standard measures for suitable lag length. It depends on minimum value of AIC and SBC for the decision about suitable lag.

4. DETAIL OF VARIABLES AND THEIR SOURCES

The dependent variable set in the study is total numbers of crimes reported in Pakistan from 1964–2008 which is the combination of different crime categories like murders, attempted murder, kidnapping, child lifting, dacoities, robberies, burglaries, cattle theft, and other thefts.

The demographic variable, urbanisation rate (UBZ), is used as independent variable and shows the proportion of total population living in urban areas. Unemployment rate (U) is simply the number of unemployed person out of total labour force. Data on unemployment rate is available for many years in published form. Where ever required, the data gaps are filled by using interpolation through the compound growth rate formula.

Consumer Price Index (CPI) is used for constructing the inflation (π) variable. The year 2000 is used as base year. Taking the growth rate of CPI yields the inflation rate. Income inequality is also a socio economic factor which shows the gap between the incomes of people. Education enables individuals to increase their resources. If a person is more educated, then he has more job opportunities. Hence, education paves the way to earnings through legal activities [Coomer (2003)]. One way to include this variable is to take portion of population who has education of more than 16 years. However, for avoiding the problem of multicolinearity with urbanisation rate the variable set in the study is the ratio of secondary education to higher education enrolments. The construction of this variable is base on the following formula. The ratio of this variable shows the higher education in the economy.

For above mentioned variables published data is used from various surveys, reports and articles. Data on all reported crimes from 1964 to 2008 is taken from various issues of Pakistan Statistical Year Book. These crimes are registered crimes in the sense that the Pakistan Statistical Year Book has obtained this data from Bureau of Police Research and Development, Ministry of Interior. Data on total population and urban population is obtained from various issues of Economic survey of Pakistan. Data on unemployment and labour force is also taken from various issues of Economic Survey of Pakistan for calculation of unemployment rate. Data on consumer price index is also obtained from International Financial Statistics (IFS) for calculating inflation. Data on Gini coefficient is taken from World Institute for Development Economic Research (WIDER).

4.1. Results and Their Interpretation

Table 1 shows the quantitative descriptions of the data. Average value of crimes per 100 persons (Cr) indicates that, in last 45 years, 0.20 crimes are committed per 100 persons. To make it more elaborative, we can say that, on average, 20 crimes are committed in a population of 10,000 persons. Similarly unemployment rate on average is approximately 5 percent. Tend in unemployment rate is moderate but its average value lies towards the upper end of the data. The mean value of unemployment rate demonstrates that the unemployment rate in Pakistan has remained around the natural rate of unemployment. Average values of remaining variables lie almost in the middle of the data which shows that data is almost equally spread to its mean values. The encouraging part of this analysis is the values of standard deviation for these variables, where except for education, the standard deviations in the data for all the variables are less than 1, which is acceptable.

Table 1

Summary Statistics

Variables	Mean	S.D.	Min.	Max.
Crime Per 100 Persons	0.20	0.02	0.01	0.34
Unemployment Rate	5.26	0.37	0.32	8.27
Income Inequality	35.09	0.58	27.52	41.00
Inflation	8.28	0.76	0.17	26.66
Urbanisation Rate	29.46	0.54	22.24	35.84
Education	63.83	1.28	48.68	84.38

Before estimation it is essential to check for the multicolinearity problem in the data by using correlation matrix. In our estimation we drop some variables; namely per capita GDP and Poverty with the help of above correlation matrix. It is evident from Table 2 that these variables have linear relationship with urbanisation variable.

Table 2

Correlation Matrix

Variables	Crimes	U	PCGDP	Gini	Inf	Edu	UBZ	Pov
Crimes	1.000							
U	0.757	1.000						
PCGDP	0.857	0.596	1.000					
Gini	0.223	0.144	–0.082	1.000				
Inf	–0.008	–0.035	–0.045	0.309	1.000			
Edu	0.527	0.374	0.750	–0.519	–0.057	1.000		
UBZ	0.910	0.749	0.971	0.004	-0.004	0.692	1.000	
Pov	–0.875	–0.742	–0.725	–0.375	–0.041	–0.390	–0.770	1.000

4.2. Unit Root Test

The use of time series data for analysis demands the investigation of presence of unit root in the data. For this purpose, Augmented Dickey-Fuller (ADF) test is applied for the inspection of non-stationarity problem in the variables. ADF test is applied here by considering the following two kinds.

(1) With intercept.
(2) With trend and intercept both.

The general form of ADF test can be written as follows:

$$\Delta x_t = \alpha_0 + \gamma x_{t-1} + \sum_{i=1}^{k} \beta_i \Delta x_{t-1} + \varepsilon_t \text{ (When intercept term is included)}$$

$$\Delta x_t = \alpha_0 + \alpha_1 t + \gamma x_{t-1} + \sum_{i-1}^{k} \beta_i \Delta x_{t-1} + \varepsilon_t \text{ (When intercept and trend included)}$$

Where

$\Delta x_t = x_t - x_{t-1}$

k = Number of lags in the variables and ε_t is the stochastic term

ADF has the following hypothesis

Null Hypothesis Ho: $\gamma = 0$; Variable x_t is Non-Stationary
Alternate Hypothesis H1: $\gamma < 0$; Variable x_t is Stationary

If the calculated value is less than the critical value we will reject the null hypothesis of non-stationarity in data in favour of alternate hypothesis of stationarity of data. However, the acceptance of the null hypothesis would mean that the series is non-stationary at level and required to be different to make it stationary. The results of the ADF test are illustrated in Table 3.

Table 3

Results of the Unit Root Test

Variables	Intercept	Trend and Intercept	Conclusion
Crime			
Level	–1.3468 (0.5993)	–2.6140 (0.2760)	I(1)
1st Difference	–7.5804 (0.0000)	–7.5091 (0.0000)	
Urbanisation			
Level	–1.6725 (0.4378)	–2.9728 (0.1512)	I(1)
1st Difference	–5.2233 (0.0001)	–5.2448 (0.0005)	
Unemployment			
Level	–2.2492 (0.1927)	–1.5598 (0.7923)	I(1)
1st Difference	–4.8503 (0 .0003)	–5.1717 (0.0007)	
Inflation			
Level	–1.2651 0.1864	–3.0231 (0.1377)	I(1)
1st Difference	–4.7782 (0.0004)	–4.7326 (0.0026)	
Income Inequality			
Level	–2.4629 (0.1314)	–2.4326 (0.3585)	I(1)
1st Difference	–4.7662 (0.0004)	–4.8335 (0.0018)	
Education			
Level	–1.4869 (0.5306)	–1.8000 (0.6873)	I(1)
1st Difference	–5.6426 (0.0000)	–5.7608 (0.0001)	

The figures of the ADF test shows that all variables are non-stationary at level, supporting the null hypothesis that unit root problem exists in these variables. Consequently, all variables are I (1) which indicates that the data is stationary at first difference. Next step is to select the appropriate econometric technique. The application of either cointegration or Vector Autoregression (VAR) depends on the results of Johansen (1988) cointegration test. If the test shows that there is a unique long run relationship among the variables of analysis, the appropriate technique would be cointegration. On the other hand, the absence of a unique long run relationship among the variables would ask for the application of VAR. Keeping in view the above discussion, we apply the Johansen cointegration test to detect a unique long run relationship among the I (1) variables used in the analysis.

Tables 4 and 5 show the results of Johansen cointegration test. Both the trace statistics and eigenvalue statistics in the two tables show that there is a unique long run relationship among the variables because in both cases the test shows one cointegrating equation at 5 percent level of significance. Thus, the Johansen cointegration test confirms the existence of a unique long run relationship among the variables; namely, crimes, urbanisation, unemployment and inflation. So the hypothesis of zero cointegrating vector is rejected in favour of the alternative hypothesis that there is one cointegrating vector. It suggests that we should apply the cointegration technique and interpret the long run parameters obtained from this estimation. We now turn to the estimation of variables. The results of Johansen estimation are demonstrated in Table 6.

Table 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesised No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.524653	55.45818	47.85613	0.0082
At most 1	0.255807	23.47868	29.79707	0.2234
At most 2	0.214283	10.77410	15.49471	0.2258
At most 3	0.009358	0.404294	3.841466	0.5249

Table 5

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesised No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.524653	31.97950	27.58434	0.0127
At most 1	0.255807	12.70458	21.13162	0.4798
At most 2	0.214283	10.36981	14.26460	0.1888
At most 3	0.009358	0.404294	3.841466	0.5249

Table 6

Cointegrating Coefficients

Variables	Coefficient	Std. Error	t- Statistics
Urbanisation	0.020590	(0.00414)	4.9734
Unemployment	0.012471	(0.00606)	2.0579
Inflation	0.010611	(0.00200)	5.3055

Results of Table 6 confirm that all three variables are the important determinants of crimes in Pakistan. Results suggest that all the variables are significant at conventional levels of significance. These results are logical because urbanisation in Pakistan is a serious matter and motivating people towards crimes. The lack of planning regarding the expansion of urban areas (urbanisation) results in scarcity of resources, which in turn motivate people to involve in criminal activities. People move from rural areas to the cities in search of higher earnings. However, when they do not get jobs, or get jobs with lower earnings, they may turn to criminal activities in order to fulfil the desire of higher earnings. Unfortunately, the records of all these people are not present with the concerned authorities, which may help them to hide themselves easily in the populated urban areas. The lack of record and high population density raises the probability of not being caught after committing a crime. This means that the opportunity cost of involving in criminal activities is low, which is a motivational factor for involvement in crimes.

Second economic determinant is unemployment which has also positive impact on crimes. Our result is consistent with the work of Becker (1968), Ehrlich (1973) and Wong (1995). They concluded that unemployment is an indicator of income opportunities from legal sector. Hence, the increase in unemployment reduces income opportunities from legal sector which thereby raises the possibility of committing crimes. The third economic variable, inflation, also has positive impact on crimes in case of Pakistan. Inflation has an adverse effect on the real income of an individual. Consequently, if that individual desires to keep his utility at the same level, he will have to raise his real income, which may force him to be involved in criminal activities [see, for example, Allen (1996), and Omotor (2009)].

Tables 7 and 8 show again the Johansen cointegration test but this time the variables included along with urbanisation are income inequality and education. In the previous case the two variables with urbanisation were pure economic variables whereas in this case the variables are socioeconomic. The trace statistics and eigenvalue in these two tables show the unique long run relationship among the variables. Thus again the Johansen test confirms the long run relationship among the variables.

Table 7

Unrestricted Cointegration Rank Test (Trace)

Hypothesised No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.545250	33.88429	28.58808	0.0095
At most 1	0.342494	18.02995	22.29962	0.1777
At most 2	0.168445	7.931664	15.89210	0.5559
At most 3	0.108707	4.948524	9.164546	0.2891

Table 8

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesised No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.545250	33.88429	28.58808	0.0095
At most 1	0.342494	18.02995	22.29962	0.1777
At most 2	0.168445	7.931664	15.89210	0.5559
At most 3	0.108707	4.948524	9.164546	0.2891

The cointegrating coefficients are presented in Table 9. Once again the results confirm that urbanisation has significant positive effect on crimes in Pakistan. The results also confirm the fact that income inequality is an important determinant of crimes in this country. Nonetheless, this result is contradictory to Fleisher (1966) and indicates that demand side effect is weaker in Pakistan which implies that if there is more income in the economy or people have more income then they will not commit crimes. In other words, they will not adopt the illegal way of earning money because they already have the money from some other legal sources. However, in Pakistan, the supply side effect is stronger which implies that when the gap between "haves" and "have not" is widened, then the "have not" will adopt illegal ways to earn money the rich ones. Thus, we can conclude that income inequality has long term positive relationship with crimes in Pakistan.

Table 9

Cointegrating Coefficients

Variables	Coefficient	Std. Error	*t*-Statistics
Urbanisation	0.026001	(0.01124)	2.6684*
I. Inequality	0.056076	(0.01159)	3.2311*
Education	0.011953	(0.00581)	2.0573*

The second socioeconomic variable, education, is also indicating long run positive relationship with crimes. We are linking crimes here with the higher education. The reason of positive relation is the unavailability of jobs to those who hold higher degrees. After completion of education, when these young degree holders do not find jobs, may be due to corruption or limited number of vacancies. The increase in unemployment variable is also showing the involvement of educated persons in illegal activities. Table 9 is showing t-values which are significant at 5 percent level of significance.

For determining the true sign of education we run the third model on which explanatory variables are urbanisation, unemployment and education. Still the long run and unique relationship exist and by including unemployment with education results are significant and give us the negative sign of education variable. So now we can conclude that higher education has negative relation with crimes in Pakistan.[1]

[1]We have also run the regression using the interaction term of education and unemployment and found the sign positive. This means that the presence of educated unemployed persons has positive effect on crimes.

4.3. Robustness of Results

One of the purposes of estimating three models was to check the robustness of results. Table 10 is constructed to summarise the results of the three models. This also make is effortless to check the robustness of parameters values. It can easily be viewed from the table that the coefficient of urbanisation is very robust both in terms of value and sign. The significance of the variable is not affected either in three models. Hence, we can easily conclude that urbanisation is a robust determinant of crimes in Pakistan.

Table 10

Cointegrating Coefficients

Variables	Model 1	Model 2	Model 3
Urbanisation	0.020590	0.026001	0.012046
	(4.9734*)	(2.6684*)	(3.1700*)
Unemployment	0.012471		0.031316
	(2.0579*)		(4.1922*)
Inflation	0.010611		
	(5.3055*)		
I. Inequality		0.056076	
		(3.2311*)	
Education		0.011953	-0.004424
		(2.0573*)	(2.6975*)

5. CONCLUSION

The first and the main conclusion is that there is positive association of urbanisation with crimes in Pakistan. With the help of three models we conclude that urbanisation is very important determinant of crimes in case of Pakistan. Because in all models we include different variables with urbanisation but there is no big change occur in value of the coefficient of urbanisation. This robust analysis shows the very strong positive relation of urbanisation with crimes in Pakistan.

The other outcome is that in Pakistan inflation, unemployment and income inequality also the main determinants of crimes. Education also shows positive relation with crimes but this is not the right sign because we estimate model with urbanisation, unemployment and with education then its sign become negative. It means that unemployment captures the sign of education so its right sign is negative. If there is more high education in Pakistan then this will reduce the crimes also.

The next important outcome is the cause of this relation which is the lack of planning of urbanisation. As hundred years ago Marshall (1920) identified the benefits of urbanisation like knowledge spillover because of cluster of highly skilled workers. Similarly labour market pooling and specialised suppliers. These are all the benefits of urbanisation. But in case of Pakistan urbanisation causes more crimes. So the reason behind is the unplanned urbanisation in Pakistan. Because of this lack of planning resources become scarce, land shortage problem and environmental degradation occur which motivate people towards crimes.

This study brings the important policy implications. The policy makers should make some planned districts for adjusting the urbanisation into those districts. These

districts should have more chance of employment and more capacity to absorb the rapid urbanisation. After getting good education people do not have suitable job. Then those persons can adopt illegal ways to earn more money. But the special focus should be on infrastructure development because since 1964 urbanisation increases.

Second important implication is that government should create job opportunities in rural areas as well. This process will reduce the burden of unemployed persons in urban areas and finally reduce crimes. Moreover, the policy makers should try to keep inflation within acceptable limits so that the real income of consumers does not lose its purchasing power.

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Reformed GST: Challenges and Opportunities

ABRAR AHMAD KHAN

Reformed GST as you know is a law which we have introduced in National Assembly. Its main features are that we are proposing minimum exemptions because our present law gives lot of exemptions. The second basic thing is about zero rating. Presently we have zero rated even domestic supplies for five exports sectors and even others sectors also. We are restricting zero rating for exports only and for domestic supplies it will be taxable. The third major thing is that we are increasing registration threshold from Rs 5 million to Rs 7.5 million. This proposal will spare smaller tax payers from incurring the compliance cost related to keeping of records and filing of returns. Then the fourth major change in the new law is that buyers have to give their CNIC or NTN to the sellers. This provision will help in keeping smaller taxpayer outside tax net and bringing bigger ones in tax net. Then there are lot of distortions in the existing law in the form of special schemes and fixed tax schemes. These schemes will not be part of the new law. The new law has been discussed in Senate's Finance Committee where there have been objections about certain provisions which have been considered as very harsh and government has promised to consider softening them.

It would be pertinent to mention that original proposal for this reform was an integrated VAT on goods and services but what actually happened was that one of the provinces did not agree for inclusion of all services in this arrangement. The present position is that agreement is for certain services only. After 18th amendment in the Constitution the taxation of services falls wholly in the domain of provinces. Further progress on this issue will require agreement from the provinces.

One other major distortion in the present sales tax system is multiple rates ranging between 17 to 25 percent one rate is now even 8 percent for domestic sugar, for imported sugar it is 17 percent. Restriction of input adjustment to 90 percent is another distortion in the present system. Government intends to remove these distortions through new law. Government has got done two studies, one is about services and the other one is about withdrawal of exemptions on remaining goods. Additional revenue estimated from services is Rs 60-70 billion if provinces impose them on remaining services. Withdrawal of sales tax exemption from major items like fertilisers, pesticides, tractors and machinery may give additional revenue of Rs 50-60 billion per annum. The above are the main features of the new law. If there are any questions, I will be too happy to answer them.

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From GST to RGST: A Raucous Ride

ATHER MAQSOOD AHMED

The transition from General Sales Tax (GST) to Reformed General Sales Tax (RGST) has become an intricate and controversial topic for no particular reason. Let me start the discussion by acknowledging that RGST is not a new tax as generally perceived, rather it is the old GST which when fully implemented would be a sufficiently broadened and extended version of the existing GST. The changes in the existing GST would include withdrawal of many of the exemptions and concessions that have been granted over time, gradual abolition of the zero-rating of domestic sales while maintaining zero-rating of the export sector, and extension of the existing GST to services that are currently outside the tax net. Thus, those who are opposing RGST believing it to be a new tax are required to be properly educated by the Sales Tax and the Taxpayers' Education and Facilitation wings of the Federal Board of Revenue (FBR).

In order to understand the possible challenges and opportunities that could be encountered while implementing RGST let us go back in history and remind ourselves that the transition from sales tax (ST) to GST in early 1990s was not smooth and trouble-free and we should not expect anything different when progressing from GST to RGST. Despite initial hiccups due to operational difficulties and resistance from the business community we know that sanity did prevail and the first phase of GST was levied. The policy decision that there will be substitutability between indirect taxes was one of the motivational factors for the acceptance of GST. The stakeholders were informed that the new tax called GST would replace most of the existing excise duties along with substantial reduction and rationalisation of customs duties. Thus, the additional burden of the tax will be substantially less than what was being anticipated at that time. However, despite this assurance, the speed of implementation of GST was unfortunately fairly slow as compared to the speed at which tariffs were reduced and rationalised and excise duties were removed. Consequently, there was a revenue loss for the revenue authority equivalent to one and a half to two percent of GDP while the benefits were not passed on to the final consumers. This clearly indicates that without due care there is an initial cost of reform initiative in fiscal domain.

It is also relevant to discuss at the outset the rate structure of GST. As we all know that the experimentation of sales tax rate started with the adoption of 12.5 percent rate that was quickly raised to 18 percent in subsequent years. It was reverted back to 15 percent only to be increased again to 16 and then to 17 percent. Higher and multiple rates also prevailed for the non-documented sectors. Realise that all these changes were

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introduced within a short span of 15 to 20 years which is an obvious indication of inconsistency and indecisiveness. While the revenue authority did gain in terms of tax collection, there was an obvious cost of this topsy-turvy behaviour for the taxpayers. The transition from GST to RGST has been analysed within this backdrop while acknowledging the fact that now we are moving from easy to tax, i.e., taxation of commodities, to relatively difficult to tax areas, i.e., taxation of services, while gaining some of the turf that was lost to powerful players in the shape of concessions and exemptions.

What could have been the challenges and gains if the Government decides to levy RGST from January 2011? To answer this critical question, let me concentrate on four areas. The first one naturally relates to possible revenue gains from RGST. One needs to have fair idea of how much additional revenue could be collected when the tax base is broadened by bringing additional services into the tax net.[1] The second and third issues concern with macroeconomic and distributional consequences of GST. Finally GST has serious issues with regard to tax administration, especially related to tax fraud and the operational readiness of FBR. One has to evaluate whether or not the tax administration is ready for this ambitious undertaking.

Using Sales Tax Forecasting model, an initial exercise was undertaken to determine the revenue gains of bringing additional services in the tax net. The assumptions to start calculations included use of 15 percent rate for such services as construction and land development, wholesale and retail trade, banking and insurance, real estate, ownership of dwellings, personal and household services, social and cultural services, and business services. To start with health and education services are assumed to have been exempted from tax on the grounds that the country is already deficient as far as human capital development is concerned. A very low compliance rate of 20 percent has been assumed for the simple reason that the overall compliance rate, especially at the wholesale and retail level, was quite low before the introduction of e-filing in GST.

Using this information, it was found that RGST could fetch an additional sum of Rs 35 billion on account of new services. As of today when half of the year has already passed, if the tax is levied from January 1st, we should expect no more than Rs 17 to 18 billion of additional revenue in the remaining six months. On the other hand, learning from international experience, if we start with a lower tax rate of 10 percent rather than 15 percent then the amount of additional taxation will reduce to Rs 10-12 billion only. Simultaneously, since the tax authorities are contemplating on reducing the existing standard tax rate by at least one percentage point and are also planning to do away with higher tax rates, we expect that the cost of these measures would be around 10 to 12 billion rupees. Thus, taken together, it essentially reduces to a zero sum game. Under these circumstances when initial revenue gains are negligible, the natural question is should the authorities pursue an extended version of GST which would be much closer to VAT? Notwithstanding this less than optimistic scenario, I strongly favour reformed GST over the existing GST for the simple reason that a broad-based tax on consumption (GST or RGST or VAT, the name really does not matter) is a money machine. There is enough evidence in the literature to prove that countries which have opted for a comprehensive

[1]It is important to point out that some of the services having significant tax contribution, like telecom and financial services, are already in the tax net, albeit indirectly.

VAT have generated so much of revenue that they were able to increase the size of the government on the one hand and spare enough resources for productive investment leading to employment and growth on the other.[2] Since Pakistan is in dire need of additional resources, we need to revamp GST as early as possible.

It is unfortunate that the tax has been made controversial without analysing the macroeconomic and distributional consequences of a broad-based GST. There is a widespread fear that RGST will be highly inflationary. In this regard it is important to note that to the extent that certain exemptions will be withdrawn and additional services will be liable to taxation there will be a difference in producer and consumer prices. Hence some prices would go up. On the other hand, since the standard rate will be reduced and higher rate structure will be abolished, this should result in lowering of prices of a large number of commodities. It is anticipated that the net effect will be only a marginal increase in prices not because of additional taxation rather due to downward rigidity of prices as businesses seldom reduce their prices. Besides this, inflationary consequences would also depend on how monetary policy is coordinated with the fiscal policy. An accommodating monetary policy would mean that prices will rise by the amount of tax, whereas a tight monetary stance would imply reduction in factor payments and therefore there will be limited consequences for inflation. Regarding trade balance and investment, the impact of tax on trade balance is expected to be neutral. While imports will be discouraged because of tax and exports are already zero-rated, we should not expect trade balance to deteriorate. Similarly, the tax will not be anti-investment as such provisions as input adjustment and refund on input tax will continue to be available on raw material and machinery and equipment.

Regarding distributional consequences, contrary to available evidence it is quite common to hear that the burden of tax is going to be shifted to lower segments of the society and hence it will regressive. At least three recent studies are available in the literature where incidence of GST has been quantified using Household Income and Expenditure Survey (HIES) data. All of them have concluded that GST tax is mildly progressive. If indeed this outcome is true then we should actually be looking forward to this tax rather than blocking it. Another critical factor to be considered is what is the alternative to GST? Historically the alternatives to GST are customs and excise duties, which incidentally are more regressive than GST.

Let me make my final comment on matters pertaining to tax administration. The two issues that are of immediate concern are: possibility of tax fraud and operational readiness of tax authority in extending the tax base to hard-to-tax areas. The tax fraud originates from zero-rating of exports, allowance for input adjustment, carry forward, refund claim on inputs and similar provisions. Many developed economies, where systems and procedures are firmly in place, are continuously being haunted by the menace of tax fraud. The developing countries are relatively more vulnerable to this. Pakistan too has serious problem with authenticity of refund claims and their timely disbursement. The authorities tackled the issue by zero-rating of five export-oriented industries and later on the concession was extended to some other industries. It was well understood that zero-rating would seriously jeopardise VAT spirit, but there was limited

[2]In Pakistan also GST is a leading revenue spinner—the contribution of GST in federal tax receipts is nearly 40 percent.

choice. Technology through computerisation of taxpayer records was supposed to help in finding out the true extent of refunds and rebates while squashing the use of flying and fake invoices, but it has failed FBR for one reason or the other. How to get around this problem so that the true spirit of VAT is preserved and tax fraud is minimised remains a critical concern. Even though some progress has been made in this regard, but the problem is expected to aggravate when an extended version of GST will be in operation.

Similar is my concern on operational readiness before embarking upon RGST. Currently the tax base is very narrow both in terms of commodities as well as taxpayers. There are only five commodities that generate nearly 80 percent of domestic sales tax receipts and less than 1500 taxpayers contribute nearly 90 percent of domestic sales tax in this country. We are all aware of the fact there are large number of cities in all provinces producing specialist goods but unfortunately the tax collection is very low because the business activities are largely un-documented.[3] Has the tax department prepared itself to exploit the tax potential of this largely informal sector? Has the process of business registration and documentation started? If the answer to these questions is no, then obviously or we have already given up the hope. We have, therefore, indirectly accepted that the possibility of broadening the base is very limited in the informal sector? In this case the implementation of RGST is too far off from reality and we should forget about deadlines. Thank you very much.

[3]For example Sialkot is producing sports goods, Wazirabad cutlery, Gujrat fans, Okara furniture, Kasur leather goods and so on.

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Reformed GST: Challenges and Opportunities

ASAD UMAR

Firstly I would like to appreciate the views and compliments. I was mentioning to Mr Idrees Khawaja that perhaps they could have chosen a much better representative for the private sector because my view is distinctly in the minority in case of RGST. I will just share with you where the private sector stands on the issue of RGST, what their opinion is and then I will give you my own stance on the subject as well as justification on the same. As you would know from newspapers and other media, the private sector is strongly against the imposition of RGST. The vast majority of chambers, which represent the bulk of Pakistan's private sector, have been vociferous in the opposition of RGST. I must mention here that in addition to my responsibilities at Engro, I also serve in the role of Chairman of Pakistan Business Council, which was created a few years ago. Pakistan Business Council comprises of largest business groups of Pakistan. Every single large business group of Pakistan is its member, including some of the key multinationals operating in Pakistan. Pakistan Business Council formally supported the RGST, even during its hearing in the National Assembly Finance Committee. Part of the difference that you see here can be explained in terms which would be flattering to us. We have been part of the industry since a very long time but we realise where the world is headed, and understand that a modern country cannot progress and cannot be run effectively with a tax-to-GDP ratio which is in single digit. But since the private sector is not significantly represented here, I think it is only fair that I try to bring forth where some of their apprehensions come from. We at large businesses have management systems and teams who are sophisticated enough to deal with complex systems. We have the necessary resources which enable us to engage the most expensive lawyers in Pakistan, and fight with the FBR when we see corruption or unfair practices being carried out. We can also raise issues that we face in front of the highest authority in the country. The vast majority of the Pakistani businessmen are small traders or small manufacturers. They do not have the systems and resources like large companies. Moreover, fact of the matter is that the tax machinery in Pakistan is both incompetent and corrupt. Therefore, it is a very legitimate concern on part of the business community that the RGST will make their lives difficult, more than the way economic theory portrays it to be. This is because there are certain realities that have to be looked at.

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Having given you our position that we support RGST implementation let me share with you some of the concerns that we have. The first is the threshold level of Rs 7.5 million that has been taxed. Any threshold will have this problem but the more you raise the threshold the bigger the problem becomes. I am surprised that this question was not raised in the hearing which took place (and by coincidence, it is the same question which my driver asked me). He asked how RGST would be any different from the current system. Upon explaining the concept to him, he surprised me by asking how would one determine who has a turn-over of Rs 7.5 Million. I have yet to get an answer on this question from someone. If this sector is totally undocumented, then who is going to make the call that this shop is above that threshold and this shop is not. Are we not opening the door to a massive rent seeking opportunity? I think this is an aspect that we have not paid any attention to, and demands serious consideration. One of the biggest oppositions against the RGST is the issue of inflation. Most people do not realise that today the GST is imposed on the vast majority of products except for those which are zero-rated or exempted. The manufacturer collecting the GST does so at the retail price. So even though the intermediary participants of the chain are not documented but tax is being collected effectively on the entire value added. When you go through a different system where you are now trying to recover at each stage, it is quite expected that collection from manufacturers is going to fall. Now you are moving into a much more difficult terrain. You are trying to collect from the undocumented sector. So the chain will break and indeed is going to break in many instances. As a result collection is going to be far below the set target. The third element, which is a big issue under any circumstance in the current macroeconomic environment, is that of liquidity. Liquidity problems will be created when you take away the zero rating. That is the reality and once again I am very surprised that very little has been done to address the apprehensions of the business community in this particular aspect. Even the most successful businesses are expecting problems because it is a given reality. If you look at our balance sheets right now you will see that the government of Pakistan is using refunds as a float to finance its funding requirements. The numbers have continued to float over the last few years and it has become bigger and bigger with time. Whether it is being done deliberately or is just due to absence of a sophisticated mechanism or perhaps due to weak systems, in any case it is a reality. Moreover as a result of monetisation of fiscal deficit and resultant crowding out effect, inflation has gone up, discount rates have had to follow the same direction with interest rates rising more and more. It has become quite a significant issue for businesses and it is not just the interest rates but also liquidity which is an issue for the small trader/businessman. If you look at the State Bank data on the amounts outstanding as credit to the private sector, you will see a continuous decline in numbers for the last three years. Therefore, they do not have ample liquidity, or the capacity to pay for the very expensive credit even if they can get their hands on it. Therefore, I truly believe we are setting ourselves for a difficult transition and by this I am not in any way implying that we shouldn't do it. We have to do it –that road has to be travelled, and we have to start the movement in that direction but I truly believe that we could have done much better homework in preparing for this transition and its implementation as well as in dealing with both the perceptual and the real issues which are going to be faced as a result of this.

The last thing I will say is that even those of us who support the RGST have a very strong feeling that the tax structure in Pakistan is completely and totally inequitable. The low tax-to-GDP ratio is just one issue—the inequity of that tax system is another major issue. When I used to be a director at Karachi Stock Market I ran at crusade literally arguing for capital gains tax on stock market at that time. I used to give the example of my accounts clerk who resided in Orangi, and changed two mini buses to get to office, paid tax on his income and there were many days in a year when in a single day had more capital gains—I, Asad Umar, had more capital gains than that poor clerk had in his entire year's earning, and I paid no tax on capital gains. That is just criminal.

I am glad to see we have moved in that direction but there are many other taboos which have been left outstanding. I will just mention two of them. One of them is Agriculture Tax. Everybody talks about it but again the question is of fairness. There is an incorrect impression which has been created that while agricultural tax must be imposed because it is the right thing to do, even those who support imposition of agricultural tax say that the actual collection is going to be a very insignificant amount. That is just patently wrong, and people who make that assertion have not seen what has happened to the commodity markets in the recent years. The earnings of the agricultural sector have gone up. Doing my calculations I have not finalised it, I will not take a number but it is many manifold more than the estimates that I had before. The other thing which I have to mention mainly because I come from three generations of Army Family (Fauji Khandan) is about a particular tax that was passed, specifying that if an employer gives an asset to an employee at a price below the market value the differential has to be taxed. I would want to hear from the FBR as to how much tax has been collected from all the land which have been distributed to many generals in previous years.

Once again I must say that I am not implying in any way that the RGST should not be implemented; it should be implemented but one must know that it is only an essential but insufficient condition for tax reforms in Pakistan.

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Economic Impact of Climate Change on the Agricultural Sector of Punjab

UZMA HANIF, SHABIB HAIDER SYED, RAFIQUE AHMAD, and KAUSER ABDULLAH MALIK

The aggregate global effects on agricultural productivity are expected to be negative by the late of this century, and developing countries are expected to suffer sooner and worse.[1]

1. PREAMBLE

As back as the Industrial Revolution, anthropogenic activities namely, power generation from fossil fuels and deforestation activities have been continuously increasing the atmospheric concentration of GHGs beyond their natural limits resulting in an enhanced greenhouse effect, *vis-à-vis*, an increase in global temperature. The rise in temperature could be coupled with changes in rainfall pattern, rise in sea level, and frequency and severity of extreme events namely, cyclones and droughts etc. The sum of all these changes is referred to as climate change. Climate change affects economic development in many ways, especially the agrarian economies have always depended on vagaries of nature and climate. Change in temperature, precipitation averages and extreme climate events can alter yield, income, health, sociology and physical safety. Climate change is a global phenomenon and no country is immune to it.

The disappearing of the Himalayan glaciers at a fast pace would increase the probability of extreme water flows, rendering it uncontrolled will bring heavy floods, loss of life, livestock, crops and infrastructural facilities in Pakistan, India, Nepal and Bangladesh. Climate change will affect all sectors of the economy not alone agricultural sector the most as well as health, forests, energy, coastal area, biodiversity and ecology all over the globe. In this connection, it will be pertinent to give the most recent events which have taken place across Asia.

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[1]Climate Change, Human Vulnerability and Social Risk Management. *Social Developmet Group, The World Bank Group* (Rasmus Heltberg. Steen Lau Jorgensen and Paul Bennet Siegel (2008).

The deadly mudsliding in Zhugqu county in China in August, 2010 was caused by heavy rains and floods. Some 1,248 people have perished in the mudslides and an equal number were rescued. The number of missing persons was reported to be 496.[2]

The history's worst ever flood of Pakistan in July and August 2010 were the result of heavy monsoon rains. According to an estimate of United Nations over 20 million people have been affected, and 1,60,000 square kilometer lands flooded. This has exceeded the number of combined total affectees of 2004 Indian Ocean Tsunami, the 2005 Kashmir earthquake and the 2010 Haiti earthquake.[3] At a time when Pakistan is encountered to extreme monsoon, China is mourning over the loss of human life caused by mudsliding, Russia is having a record breaking heat wave that has seen Moscow with smog from burning peatlands. Russian economists have said that they estimate the heatwave and wildfires to cut $15bn (£9bn) from economic output.[4]

Agricultural has been one of the oldest economic activities in all over the world. It is not only the backbone of foodgrain supply to the work force but also supply raw material to industries. Depending upon the natural resources, agricultural sector is vulnerable to climatic change and vagaries of nature.

Climate change has raised serious concerns for developing countries and Pakistan is not alone to face tremendous social, environmental and economic impacts. The many impacts on agricultural due to climate change have received a high contemplations in Pakistan. As the change in climate is closely linked to food security and poverty of a vast majority of the country's population. Pakistan's status as a developing country is dependent mainly on agricultural sector making it highly vulnerable to the effects of climate change. Agricultural and allied activities are the single largest sector, contributing 21 percent to GDP and employing 44 percent of workforce. As much as 65 percent foreign exchange is earned from export of goods manufactured from raw material obtained from agricultural sector. More than two-third of Pakistan population lives in rural areas and their livelihood depend on agricultural and agro-based activities (Pakistan Economic Survey, 2007-08).

In 2006, the share of agricultural sector in GDP, exports and employment level have markedly decreased. Amongst other reasons of declining agricultural productivity, change in climate has been marked a major contributor. According to Economic Survey (2007-08), agricultural sector has performed poorly in 2007-08, it grew at 1.5 percent against the target of 4 percent. The sector had suffered from multifarious reasons which also included heavy rainfall in May 2007, high temperature during August and September, 2007 and shortage of water in the overall irrigation system.

Concerns about potential adverse impacts of climate change have triggered which could be named as impact assessment research since the early 1990s. Over the past two decades, the impact assessment research has gone through a metamorphosis with gradual movement towards vulnerability and adaptation assessment. Impact assessment studies have continued on a wider horizon in order to evolve both innovations in methodology and scope of analysis.

[2]http://news.xinhuanet.com/english2010/china/2010-08/14/c_13444285.htm
[3]http://www.bbc.co.uk/news/world-south-asia-10984477
[4]http://www.bbc.co.uk/news/world-europe-10932644

It is documented in final report of Task Force, Planning Commission GoP[5] on Climate Change that there is a dire need to quantify the impact of climate change on different sectors of the economy for planning and policy making. The report has also noted that it is not easy to assess the economic impact of climate change on different sectors of the economy. But it is of very crucial importance for national planners and policymakers to develop and shape the country's development plans in the most optimal manner within the constraints of limited available resources. Viewed in this perspective, the study in hand is the first effort to quantify the impact of climate change on agricultural sector. Rabi and Kharif are two sowing and harvesting seasons in Pakistan. It has considered Rabi and Kharif mean precipitation, minimum and maximum temperature individually as climate variables. By using Feasible Generalised Least Square technique of panel regression estimations, relationships of climate variables with agricultural land price as well as marginal climate impacts are calculated. Results also reveal the magnitude of change in per acre agricultural land price with change of climate variables. The study has confirmed the hypothesis that climate change impinches considerably price of agricultural land which is a long run variable for net revenues.

The study area in hand is the Punjab province of Pakistan. Punjab is the most populous and the second largest province of Pakistan. Agricultural sector dominates the Punjab landscape both in the percentage of land (57.2 percent) in agricultural sector and also the percentage share (53 percent) of Pakistan's agricultural gross domestic product (Punjab Development Statistics, 2009). In the year 2007-08 the Punjab share in Pakistan's agricultural production of major crops was wheat 74.5 percent. Rice 59.1 percent, gram 81.7 percent, Jawar 612 percent, maize 74.5 percent, Bajra 73.4 percent, cotton 77.8 percent, sugarcane 63.1 percent, barley 33.3percent, rapeseed and mustard 58.5percent. For major fruits, Punjab's share in the overall country's production was mango 78.3 percent, banana 6.3 percent, citrus 96.7 percent , guava 78.3 percent, dates 7.9 percent and apple 0.7 percent (Punjab Development Statistics, 2009).The capacity of Punjab agricultural sector adaptability to the changing climate has never been investigated. Developing a comprehensive understanding of this adaptation capacity will facilitate efficient and viable agricultural policy reforms in the context of climate change. Study in hand is pioneering in quantifying the economic impact of climate change. By considering the results and policy recommendation, policy makers can develop climate policies based upon ground realities.

2. REVIEW OF LITERATURE

2.2. Historical Background

A Swedish Nobel prize laureate, chemist cum physicist, Arrhenius (1896) was the first scientist who speculated that concentration of carbon dioxide in the atmosphere could substantially alter the global temperature from greenhouse effect.

The debate of greenhouse effect entered in the domain of economics by Nordhaus (1982), who has discussed in his article that how change in climate from concentration of carbon dioxide impacts the economy. Nordhaus (1982) noted that climate change

[5]Final Report, Task Force on Climate Change, Planning Commission of Pakistan, 2010.

impact is channelised into the economy in two ways; first production side and second is the economy through the policy induced abatement activities.

The potential adverse impacts of climate change on the economy have triggered which have started impact assessment research since early 1990s [Kumar (2009)]. Impact assessment has lead to positive and normative policy for adaptation and mitigation of effects due to climate change.

2.3. Hedonic Price Method

Hedonic method is derived from Ricardian approach. The Ricardian Approach has been based on the observation by David Ricardo (1772–1823). It has stated that farmers maximise their profits by using land in the declining order of fertility i.e. climate and soil quality etc. The land with the most suitable climate for the most profitable agricultural activity will be put to that use [Polsky (2004)]. The approach measures the climate and other factors affecting the net farm output, net revenue or land values [Mendelsohn, Nordhaus, and Shaw (1994)]. As can be seen, this cross-sectional methodology used for agricultural production is a direct measurement of climate sensitivity. Its application is across locations besides the adaptation response by farmers to local climate profile.

Schlenker, *et al*. (2006) has opined that the Ricardian approach is a hedonic method of farmland pricing that assumes the value of a tract of land equals the discounted value of the stream of future rents or profits that can be derived from it.

2.4. Land Climate Hedonic Price Method

Rosen (1974) has suggested that hedonic relation will arise due to the heterogeneity in quality of the attributes of the goods. Agricultural land prices are dependent upon factors that determine agricultural productivity i.e. climate (max, min temperatures, precipitations, solar radiation etc.), soil quality and slope (flat vs. hilly). [Kolstad (2000)]. Goulder and Pizer (2006) have opined that "applied to agricultural, the hedonic approach has aimed to embrace a wider range of substitution options, employing cross-section data to examine how geographical, physical and climate variables have been related prices of agricultural land.

From the discussion of Ricardian approach and Hedonic Method, it may or should not be construed that the two models overlap each other. As Ricardian approach is based upon Hedonic Method, they supplement and complement.

2.5. Land Climate Hedonic Price Studies

Mandelshon, *et al.* (1994) have introduced hedonic agricultural land climate price to link land value to land characteristics including climate factors. By regressing the per acre annual value for cropland, pasture and grazing for counties across the United States on climate and other control variables, they found that there is a quadratic relationship between farm land and climate variables.

In a subsequent paper Mandelshon, *et al*. (1996) have further expanded the method by using aggregate farm value per acre in a county. The result indicated that climate change not only affects the value of existing farms but also the probability that land would be farmed in the years coming ahead.

Maddison (2000) employed the Hedonic Land Climate Price Method to estimate the marginal value of various farmland characteristics in England and Wales. His findings have revealed that climate, soil quality, and elevation, in addition to the structural attributes of farmland, were significant determinants of farmland prices.

Reinsborough (2003) had opined that climate change effects will be negligible for the Canadian agricultural sector. Some economists have prediction that the potential benefits of climate change lie in shifting from temperature to tropical crops with climate change. According to Reinsborough (2002), "this might be able to moderate negative effects in Canada. However, it did not appear to induce dramatic increase in farmland value or farm revenues.

The study had incorporated the socio-economic variables (1996 Census of Canada), and farm variables [Agricultural Census (1996)]. Soil classification, climatic data were obtained from National Ecological framework.

Global Information System (GIS) software "Arc Info" was used for ecological data (district level), and weightage was done of each eco district fell which within the each agricultural Census Division and ecological values calculated for the 267 Census Divisions. In case of missing data for one or more variables for ecological district (16 of 1,022), the data from neighbouring ecological districts were assigned.

Time series data from 1961-90 was used for econometric analysis. Monthly climatic normals (temperature and precipitation) were used as climate changes had longer term trends rather than short-term variations. The relationship between climate and agricultural was estimated with farm value as dependent variable. The linear terms represented the marginal value of climate. The Canadian means was represented by the linear terms and the quadratic mean reflected the marginal effects as one moved away from the mean. Whit's heteroscedasticity consistent estimators were used being the robust standards error.

Socio-economic variables were chosen to reflect the potential of land in alternate uses. Income per capita as indicator of being wealthy and population density (and its square term) captured the urban/rural characteristics. Migration reflected the growing areas or areas in decline which would affect land value and also its future use.

The environmental variable namely latitude showed the nearness of an area as well as it provided a proxy for the length of day. Solar radiation was also included as an important determinant of farm returns. The clay and sand contents were included as rough proxies for soil quality. Irrigation was included in the original analysis but omitted, as it was deemed an endangered variable with insignificant effect on the resultant value. The result showed that there were minor positive benefits from climate change within wide uncertainty for the Canadian agricultural sector.

Weber and Hauer (2003) have found that Candian agricultural landowner could gain substantially as a result of climate change. By regressing per acre annual land rental on climate and other non climate variables, they found that Canadian agricultural will be benefited from climate change by a $5.24 billion increase in annual GDP.

Polsky (2004) has discussed that Ricardian climate sensitivity analyses should employ spatial effects and temporal changes. He applied Ricardian Hedonic approach by taking per acre annual agricultural land price as dependent variable. The model used by Polsky reflected time specific contingencies as well as space characteristics. From the

model came out the concept of spatial economics of a geographical variables i.e. per acre land price. The value of land will be determined not only by the local conditions but also by conditions of the geographical neighbours. Polsky (2004) had used six spatial econometric models to explore human-environment relationship associated with climate sensitivities had varied over space and time in the U.S Great Plains for the time period 1969-1992.

Lippert, Kirmly, and Aurbacher (2008) has applied Hedonic Land Climate Price Method/Ricadian Approach to evaluate the impact of climate change on Agricultural sector in Germany. Historic climate data for 1961-1990 in respect of land rental, utilisable agricultural area and share of grassland were used in the analysis. In order to make projections A1B scenario of IPCC was used. The result has shown significant dependencies between climate factors and land rental. Land rental is positively significant with rising temperature and precipitation. Projection for the years 2011-2040 showed that a moderate climate change (rise) could increase in land rental.

3. CLIMATE CHANGE IN PAKISTAN

The phenomenon of Greenhouse Gases (GHG) has been going on ever since the universe came into being. The Earth's average temperature is a cause and effect of Greenhouse Gases emission. The Industrial Revolution, anthropogenic activities namely, power generation from fossil fuels and deforestation activities have been continuously increasing the atmospheric concentration of GHGs beyond their natural limits. These have resulted in an enhanced greenhouse effect, *vis-à-vis*, an increase in global temperature. It will be worth mentioning that there is no country in the world which is immune to GHGs including Pakistan.

Pakistan vulnerability to climate change is comparatively more due to its warmer climate as it is situated in a region where the occurrence of temperature increases is expected to be higher than the global averages. Its land area is mostly arid and semi-arid. About 60 percent of the area receives less than 250 mm rainfall annually and 24 percent receives 250-500 mm. Its rivers are predominantly fed by the Hindu Kush Karakoram-Himalayan glaciers which are reported to be receding quickly due to global warming. Pakistan economy is largely agrarian and hence highly sensitive to climate. Due to larger risk of variability in monsoon rains, floods and extended droughts are experienced. Accounting for all these factors, the water security, the food security and energy security in Pakistan are under serious threat. [Task Force on Climate Change (2010)].

3.1. Pakistan's Status as a GHG Emitter

In the year 2008, Pakistan's total GHGs emission were 309 million tons (mt) of carbon dioxide ($C0_2$) equivalent, comprising about 54 percent $C0_2$, 36 percent methane, 9 percent nitrous oxide and one percent other gases. The biggest contributor is the energy sector with 50 percent, followed by agricultural 39 percent, industrial processes 6 percent and other activities 5 percent [Task Force on Climate Change (2010)].

Table 1

Comparison of Different Countries on the Basis of Their Per Capita Energy Consumption, Per Capita CO_2 Emission from Fuel Combustion and Ratio of CO_2 Emission from Fuel Combustion to Energy Consumption (2004)

Country/Region	Per Capita Energy Consumption (toe/capita)	Per Capita CO_2 Emission (tCO_2/ capita)	CO_2 Emission Per Unit Energy Consumption (tCO_2/toe)
World	1.77	4.18	2.37
South Asia	7.91	19.73	2.49
OECD	4.73	11.09	2.34
China	1.25	3.66	2.93
India	0.53	1.02	2.40
Pakistan	0.49	0.76	1.56
Bangladesh	0.16	0.24	1.47

Source: Final Report, Task Force on Climate Change, 2010.

The total GHG emission of Pakistan in FY 1994, as reported in the Initial Communication (INC) to UNFCCC were 181.7 million tons of CO_2 equivalent. These are estimated to have increased to 309.4 million tons of CO_2 equivalent by 2008. The sectoral breakup for the two years 1994 and 2008 are shown in Table 2.

Table 2

Inventories of Greenhouse Gases in 1994 and 2008

Description	1994	2008	AAGR (%)
GHG Emission from All Sectors			
Total GHG emission (Million tones of CO_2 equivalent)	181.7	309.4	3.9
Total GHG emission per capita (Kilogram of CO_2 equivalent)	1541	1922	1.6
Total GHG emission per 1000 US$ of year 2008 (kilogram of CO_2 equivalent)	2209	1942	–0.9
GHG Emission from Fuel Sector Only			
Total Emission GHG emission from Fuel Combustion Activities (million tons of CO_2 equivalent)	78.9	152.1	4.8
Total GHG emission per capita from Fuel Combustion Activities (kilogram of CO_2 equivalent	669	945	2.5
Total GHG emission from Fuel Combustion Activities per 1000 US$ of year 2008 (kilogram of CO_2 equivalent)	959	955	–
Population Growth and Gross Domestic Product (GDP)			
Population (Million)	117.9	161.0	2.2
GDP (Billion US$ in 2007-08 Prices)	82.3	159.3	4.8

Source: Final Report, Task Force on Climate Change, 2010.

3.2. Agriculture Sector in Pakistan: Current Status and Vulnerability

Agriculture and livestock sector have been the mainstay of the Pakistan economy. It contributes 22 percent to gross domestic product (GDP), accounts for 60 percent of country's exports, provides livelihood to about 68 percent of the country's population living in rural areas, and employs 43 percent of the total labour force. Its foremost challenge is to provide adequate food for the population growing at 2 percent annually without irreversibly damaging fragile ecosystem. Being open to vagaries of nature, agricultural activities are highly vulnerable to climate change. A change in climate will have far reaching implications on food security of the country mainly through reduction in crop productivity and adverse impacts on livestock health, its productivity and reproducibility as well as due to an increase production losses caused by extreme events of floods, droughts and cyclones etc. [Task Force on Climate Change (2010)].

4. THEORETICAL FRAMEWORK OF THE STUDY

4.1. Hedonic Price Approach

Economic theory says that a consumer will buy different goods for obtaining utility. Hedonic approach has gone to suggest that it is not only a good or product per se but its characteristics that provide utility. Therefore, the total amount of utility a consumer derives from the purchase of a good or product is dependent upon the total amount of product characteristics. For equilibrium, the price paid by the consumer should be equal to the sum of product's characteristics marginal monetary values. The Hedonic pricing models were first introduced in economics in the late 1960s. Lancaster (1966), Dhrymes (1967), and Ladd and Suvannunt (1976) have contributed to development of the basic theoretical framework for Hedonic pricing of consumer goods characteristics. Rayner (1970) has further extended the basic theory to include brand names in addition to the quality characteristics. The theoretical framework of the basic Hedonic price model has been applied to deduce the Hedonic property value model, Hedonic wage model and agricultural land value model in the context of climate change.

The idea of Hedonic property value can be traced back to the classical work of Wallace (1926) and Hass (1922). Generally, the property value model has suggested that environmental attributes e.g. air and water quality affect the overall property prices. Hedonic relation has arisen due to heterogeneity in the quality attributes of different properties. Lancaster (1966), Rosen (1974), Maclennan (1977), Witt, Sumka and Erekson (1979), Awan, Odelling-Sme and Whitehead (1982) Goodman (1998) and Colwell and Dilmore (1999) have contributed in developing of theoretical framework of Hedonic property pricing models. The standard Hedonic price model is based on the analysis of a cross-section of housing price at a point in time. The repeated sales model is a variant of time of the Hedonic price model that exploits a time series of sale prices of a house which structural characteristics have not changed over time. Palmquist (1982) developed the repeated sales model which has simplified the specification and estimation as characteristics that do not change can be omitted from the regression equation.

Hedonic price model can be employed to measure the economic impact of climate change on agricultural sector. A Hedonic price model to determine the economic impact of climate change on agricultural sector refers to the willingness to

pay to avoid a rise in temperature by investigation two or more agricultural lands that encounter the same climate factors as maximum, minimum temperatures and precipitations etc.

4.2. Land Climate Hedonic Price Approach

Rosen (1974) has suggested that Hedonic relation will arise due to the heterogeneity in quality of the attributes of the goods. Agricultural land prices are dependent upon factors that determine agricultural productivity i.e. climate (max, min temperatures, precipitations, solar radiation etc.), soil quality and slope (flat vs. hilly). [Kolstad (2000)]. Palmquist (1991) has opined that in agricultural sector, across different locations over time there generally have existed land price differentials, and the value of marginal changes in climate can be discerned from Hedonic land price analysis. In such a case, climate itself will become a choice variable. It can be safely presumed that long run cost minimising adaptation has already occurred.

Goulder and Pizer (2006) have opined that "applied to agricultural, the Hedonic approach has aimed to embrace a wider range of substitution options, employing cross-section data to examine how geographical, physical and climate variables have been related prices of agricultural land. On the assumption, that crops are chosen to maximise rents, the rents reflect the productivity of a given plot of land relative to marginal land, and prices are the present value of land rents. The effects of climate change variables on land prices are an indicator of their impact on productivity after crop substitution is allowed for.

Amiraslany (2010) has suggested that the land climate Hedonic price model can be used to estimate the impact of climatic, socio-economic and geographical variables in valuating agricultural land which allows measuring of the marginal contribution of the attributes in order to capitalise the land value.

4.3. Assumptions of Land Climate Hedonic Pricing Method

The Hedonic agricultural price model of climate change has been based on the following assumptions [Maddison (2000)].

- There is perfect competition in land market.
- Land values have attained the long run equilibrium associated with each region's climate.
- There is uniform market for agricultural lands.
- There is no relocation cost existing in the market. (it implies that zero transaction and moving cost with flexible prices).
- There is continuous trade-off among all characteristics.
- Agro-technologies which respond to climate change are accessible to all farmers at any given point in time.

The assumption of perfect competition implies that the information is perfect and all economic agents have free access to it. Moreover, all economic agents are rational and adapt according to the information.

4.4. Functional Form of the Model

The land values depend upon climate (maximum, minimum temperatures, precipitations, solar radiation, etc), slope (hilly vs. flat) and tendency to flood. These factors will determine productivity which determines prices of a piece of land. Another factor that could contribute to land price difference but not agricultural productivity is proximity to urban areas etc. Mendelsohn, *et al.* (1994) applied Hedonic price model to link land value to land characteristics including climate factors The Hedonic equation to estimate of the effects of climate change is given as;

$$Y_{it} = \beta_0 + \beta_1 X_{it} + + \beta_3 Z_{it} + \varepsilon_{it} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4.1)$$

Here,

Y_{it} = per acre agricultural land price in *i*th district for time period *t*.
β_0 = constant term
X_{it} = vector of all climate variables (average maximum, minimum temperatures and precipitations) in *i*th district for time period *t*.
Z_{it} = vector of all non climate variables (population density, per capita income and area under cultivation etc.) for *i*th district for time period *t*.
ε_{it} = stochastic error term

4.5. Choice of the Dependent Variable

Both the rental prices of land and asset prices of land can be taken as dependent variable. The land rental price is the price of renting the land for a given short period of time .On the other hand, the asset price of land is the price of taking time title to perpetuity [Kolstad (2000)].

4.6. Structure of the Data Used in the Model

In most of the studies for measuring the economic impact of climate change on agricultural sector have used spatial Hedonic price model across different location that relates to a single year. Rarely are available, the time series data on sales or rental prices for different types of agricultural lands. These data can be used to used to develop a repeated sales type Hedonic price model. Since some structural attributes of agricultural land do not vary over time or have negligible variation over time like soil characteristics. The repeated sales model makes the analysis simple as all attributes that are not change over time can be eliminated. Panel data with same cross-section units (e.g., districts or counties) over a given period of time can also be used to capture the economic impact of climate change. Strengths of panel data are that it can measure regional scale climate sensitivities, allowing for spatial effects and temporal change.

5. DATA AND DESCRIPTION OF VARIABLES

5.1. Study Area

The major contributor to Pakistan GDP is the agricultural sector. On farm practices have been undertaken under different climate conditions, special biophysical and socio-economic conditions prevalent in rural areas of Punjab province. These being the reasons

for selecting the Punjab agricultural sector for the study. The total land area of Punjab province is 20.63 million hectares which is about 26 percent of the total area of Pakistan. The cultivated area of Punjab is 12.51 million hectares, or 67 percent of total cultivated area of Pakistan. As stated earlier, in 2007-08 Punjab share in Pakistan's agricultural production of major crops was wheat 74.5 percent, rice 59.1, percent, gram 81.7 percent, jawar 61.2 percent, maize 74.5 percent, Bajra 73.4 percent, cotton 77.8 percent, sugarcane 63.1 percent, barley 33.3 percent, rapeseed and mustard 58.5 percent. In respect of the major fruits, Punjab share in the overall country's production was mango 78.3 percent, banana 6.3 percent, citrus 96.7 percent, guava 78.3 percent, dates 7.9 percent and apple 0.7 percent [Punjab Development Statistics (2009)].

The Indus, and its tributaries, Jhelum and Chanab are the main rivers from which canals have been taken out to supply water for irrigation in Punjab. The requirements of water for cultivation are also met from tubewells. For carrying out the study, the data of eleven districts which are also representative of different climate conditions have been used. The reason for selection of these districts namely, Lahore, Faisalabad, Sargodha, Sialkot in central region; Jhelum, Rawalpindi, and Mianwali, in northern regions; Multan, Bahawalpur, Bahawalnagar, and Rahim Yar Khan in southern region was that these places had climate observation stations.

Table 3

Share of Agricultural GDP of the Punjab in Agricultural GDP of Pakistan (at Constant Factor Cost of 1999-00)

Sr. No.	Agricultural Production Sector	2008-09			2009-10		
		Pakistan	Punjab	Percent Share	Pakistan	Punjab	Percent Share
01	Major Crops	1195031	635444	53.2	1218873	646281	53.0
02	Minor Crops	136601	287347	59.7	135008	84641	62.7
03	Live Stock	622531	260344	41.8	648106	268327	41.4
04	Fishing	21319	5003	23.5	21626	5044	23.3
05	Forestry	14094	1202	8.5	14404	1484	10.3

Source: Punjab Development Statistics, 2010.

5.2. Climate of Punjab Province

The characteristics and climate data of Punjab province have already been elicited in Chapter Four. In brief, there has occurred a rise in maximum temperature in Punjab province but the rise is not significant. There has also been observed a significant rise in the minimum temperature all across the province. As reported in Climate Change Indicators of Pakistan, 2009 Punjab, as a whole, has experienced a significant rise in precipitation.

5.3. Definition of Variables

The unit of spatial analysis for the study are the districts of Punjab. The fundamental agent in land use is the farmer or farmland. The dependent and independent variables in the study are defined in Table 4. The independent variables are categorised into two groups: climate and non-climate variables. The elaboration of these variables are as given under:

Table 4

Description of Variables

Variable	Title	Definition	Source of Data
Dependent Variable	Lprice	Average Annual market sale price of agricultural land (Pak RS/acre) at district level.	Mutation registers of land price records. Land Revenue Department, Govt of Punjab. (1970–2009)
Independent Variables	**Non-Climate**		
Area under Cultivation	AUC	Per year use of land for agricultural purposes including land under crops, vegetables, orchards etc. The unit of analysis is Thousand Hectares at the districts Level.	Punjab Development Statistics(1970–2010)
Population Density	POPD	The total number of people living per square kilometre at district level.	Punjab Development Statistics (1970–2010)
Per Capita Income	YPC	National per capita income measured in Pak Rs.	Economic Survey of Pakistan (1970–2009)
Independent Variables	**Climate Variables**		
	RABIPPT	Precipitation(millimetres=mm) normal mean for the Rabi months(October -March)	Pakistan Meteorological Department(1970-2009)
	KHARIFPPT	Precipitation (millimetres) normal mean for the Kharif months(April -September)	Pakistan Meteorological Department(1970-2009)
	MINTMRABI	Minimum temperature(Degree Celsius=^{0}C) normal mean for the Rabi months(October - March)	Pakistan Meteorological Department(1970-2009)
	MINTMKAHRIF	Minimum temperature(Degree Celsius= ^{0}C) normal mean for the Kharif months(April - September)	Pakistan Meteorological Department(1970-2009)
	MAXTMRABI	Maximum temperature(Degree Celsius= ^{0}C) normal mean for the Rabi months(October - March	Pakistan Meteorological Department(1970-2009)
	MAXTMKHARIF	Maximum temperature (Degree Celsius= ^{0}C) normal mean for the Kharif months(April - September)	Pakistan Meteorological Department(1970-2009)

5.4. Dependent Variable

The dependent variable in the study is the average sale price per acre (Pak Rs/acre) annually, which is deemed to be consistent with Ricardian Approach based on Land Climate Hedonic Pricing. The rationale for using asset price of land imbibes perpetuity as well as long-term variations are deemed to be in-built.

It is documented in final report of Task Force, Planning Commission GoP[6] on Climate Change that there is a dire need to quantify the impact of climate change on different sectors of the economy for planning and policy making. The report has also noted that it is not easy to assess the economic impact of climate change on different sectors of the economy. But it is of very crucial importance for national planners and policymakers to develop and shape the country's development plans in the most optimal manner within the constraints of limited available resources. Viewed in this perspective,

[6]Final Report, Task Force on Climate Change, Planning Commission of Pakistan, 2010.

the study in hand is the first effort to quantify the impact of climate change on agricultural sector. It was very tiring, time consuming and enduring drill to collect data of dependent variable. At the district level, town/village/mouza were selected to obtain the average price per acre of agricultural land in order to capture the impact of climate change. Town/village/mouza is the unit which is agricultural land area since 1970 to date. The farm land was not to be situated on the road side but have an easy access to agricultural markets. The annual average sale price of agricultural land was taken from the mutation registers maintained by Patwaris. To select a unit of analysis, tehsildars and patwaris of the respective districts were interviewed. The selected town/mouza/village per acre average agricultural land price was assumed to be representative of all normal agricultural lands in the respective districts. The same method was adopted to collect land price data for the eleven districts across Punjab province.

5.5. Independent Climate Variables

There are two crop sowing and harvesting seasons in Punjab, Kharif season from April to September and Rabi season from October to March. Climate variables in the study are the yearly Kharif and Rabi months mean data from 1970 to 2009.

Kharif crops are rice, sugarcane, cotton (American), cotton (Desi), jowar, bajra, maize, moong, mash, til, gowara seed, fodder, vegetables and orchards etc. Rabi crops are wheat, gram, barely, masoor, peas, rape and mustard, fodder, vegetables, tobacco, and orchards etc.

Mean of minimum temperature for Kharif and Rabi season, mean of maximum temperature for Kharif and Rabi season measured in degree Celsius (^{0}C), while mean of precipitation for Kharif and Rabi season measured in millimeters have been taken as climate variables. The data were obtained from Pakistan Meteorological Department GoP, Islamabad for the eleven districts for the period 1970-2009. The missing values were assessed by taking three years moving average.

5.6. Independent Variables (Non-climate)

The independent variables in the land climate Hedonic model used in the present research study have been divided into two categories i.e., non climate and climate variables. For non climate variables, population density i.e., persons per km^2 (POPD) and per capita income (YPC) are specified to control the competition for non agricultural land uses.

In Pakistan, four census of population have been conducted. The first census was conducted as back as 1951 and the most recent in 1998. The estimate of yearwise population growth rate at the district level in 1961, 1972, 1981 and 1998 were 2.7 percent, 3.41 percent, 2.74 percent and 2.64 percent respectively. These growth rates were used in the study. The data of population projection from 1999–2009 are taken from the Punjab Bureau of Statistics, Lahore.

The area under cultivation (AUC) is also included as an independent variable. The rationale for taking the area under cultivation as an independent variable is that it covers land use for growing all kinds of crops and orchards as well as current fallow.

The data of population density and area under cultivation were taken from different issues of Punjab Development Statistics, Punjab Bureau of Statistics. The data of per capita income was taken from different issues of Pakistan Economic Survey.

Table 5

Descriptive Statistics

Sr. No	Variable	Mean	Standard Deviation	Min	Max	Observations	Cross Sections
01	Land Price (Rs)	209,756.20	427,963.2	202.4	5333333	440	11
02	Income Per Capita (Rs)	456.67	140.88	220	800	440	11
03	Population Density	627.01	832.45	40.46	4775.39	440	11
04	Area under cultivation	543.48	449.93	78	2926	440	11
05	Rabi Precipitation	21.82	18.1	0	91.06	440	11
06	Rabi Precipitation Square	803.28	1279.015	0	8293.14	440	11
07	Kharif Precipitation	68.50	53.61	0.08	294.58	440	11
08	Kharif Precipitation Square	7560.95	11139.72	0.01	86779.34	440	11
09	Rabi Maximum Temperature	26.14	2.24	19.70	32.90	440	11
10	Rabi Maximum Temperature Square	688.77	120.14	388.09	1082.410	440	11
11	Kharif Maximum Temperature	37.16	1.554	32	42	440	11
12	Kharif Maximum Temperature Square	1383.90	122.83	1062.70	1062.70	440	11
13	Rabi Minimum Temperature	12.16	5.299	6.10	30.32	440	11
14	Rabi Minimum Temperature Square	175.92	185.99	37.21	919.30	440	11
15	Kharif Minimum Temperature	23.33	4.618	9.78	37.29	440	11
16	Kharif Minimum Temperature Square	565.69	201,05	95.71	1390.63	440	11

5.7. The Basics of Panel Model

Given herein is the econometric framework used in measuring the economic impact of climate change on Punjab agricultural sector. The model specification has involved regressing per acre land price over climate variables for the years 1970–2009 while controlling the other non climate variables affecting agricultural land. The data is pooled for thirty years for eleven districts of Punjab. District level per acre agricultural land price was regressed on climate, non climate (control) variables to estimate the best use value function for Punjab agricultural sector. The econometric methodology is defined as Hedonic approach and one way panel fixed effect approach.

5.8. The Panel Fixed Effect Approach

A panel is a cross-section (firms, individuals, group of people) which is surveyed over a certain period of time span. Panel data sets, the data sets on different cross-sections over a certain period of time, help the researcher in modelling difference of attributes across cross section. Heterogeneity across units (cross-sections) is an integral part of the panel data analysis [Greene (2003)].

The reason to include place (district) fixed effects is that district fixed effects can absorb unobserved time invariant determinants of the dependent variable.

When Cross section fixed effect is applied, model have constant slopes but intercept differ according to time. The source of variation in the intercept is some unobserved attributes (i.e. preference for agricultural occupations in specific districts agricultural practices etc.). These unobserved attributes vary from one district to the other but are constant over time [Stock and Watson (2003)].

The Standard Model is:

$$Y_{it} = \beta_0 + \beta_1 C_{it} + \beta_2 C_{it}^2 + \beta_3 Z_{it} + \varepsilon_{it} \quad \text{...} \quad \dots \quad \dots \quad \dots \quad \dots \quad (5.1)$$

Here,

Y_{it} = per acre agricultural land price in district over time period *t*.

α_0 = constant

C_{it} = vector of climate variables in *i*th district for time period *t*.

C_{it}^2 = vector of climate variables in quadratic form in *i*th distract *t* for time period *t*.

Z_{it} = vector of non climate variables (population density, per capita income and area under cultivation) for *i*th district for time period *t*.

ε_{it} = stochastic error term.

To show one way fixed effect, assume that $C_{it,}$ C_{it}^2 and Z_{it} all are include in the X_{it} matrix.

Then

$$y_{it} = \eta_{districts} + \beta X_{it} + \mu + \varepsilon_{it}$$

Then, the one way (cross-section) fixed effect estimator for α_0, $\beta_{1,}$ β_2 and β_3 in (5.1) is *b* as follows [Amiraslany (2010)].

$$b = [\sum_{i=1}^{40} \sum_{t=1}^{40} (x_{it} - \bar{x}_i, \bar{x}_{,i} + \bar{\bar{x}})(x_{it} - \bar{x}_i, \bar{x}_{,i} + \bar{\bar{x}})'] -$$

$$^1x = [\sum_{i=1}^{40} \sum_{t=1}^{40} (x_{it} - \bar{x}_i, \bar{x}_{,i} + \bar{\bar{x}})(y_{it} - \bar{y}_i, \bar{y}_{,i} + \bar{\bar{y}})']^{-1}$$

Now, the regression constant term is:

$$\hat{\mu} = \bar{\bar{y}} - \bar{\bar{x}}' b$$

and fixed effect one-way estimator for district fixed effects is:

$$\eta_{districts} = (\bar{y}_{i,} - \bar{\bar{y}}) - (\bar{x}_{i,} + \bar{\bar{x}})' b$$

Here the bar symbols shows the average in the above formulas.

5.9. Econometric Estimation

An econometric model is an important tool for the researcher to part and determine the influence of several explanatory variables on a dependent variable. The important issue is that climate variables and squared terms of them inherently have potential multicolliniarity. Kaufman (1998) had suggested that regressing models with un-demeaned (when data are not subtracted from their mean) climate variables lead to frequent switching of the parameters estimates and may cause large marginal effects. According to Stock and Watson (2003) regression softwares will compute the fixed effects in two steps. First, the entity specific average is subtracted from each variable. Second, the regression is estimated using "entity-demeaned" variables. This problem is tackled as E.views software package is used for regression estimation, and all climate variables have been demeaned (subtracting all values from their mean) to prevent the problem of multicolliniarity in the estimated model.

Feasible Generalised Least Square (FGLS) technique with cross section SUR has been used to estimate the panel regression model. In the study in hand, the following aspects have been considered to determine the robustness of the model.

- The significance level of each explanatory variable will be determined by the co-efficient t-statistics.
- The fit of overall model is determined by the F-statistics and R-squared values.
- Individual explanatory variables' direction of influence on the dependent variable and its consistency with literature and Pakistan climate conditions will be checked.

The description of Panel regression methodology with cross-section fixed effects for estimation has been given in chapter five.

Based upon the methodology, the land climate pricing model has estimated economic impact of climate change normals on the agricultural sector in respect of eleven districts in Punjab for the period 1970–2009. The econometric approach applied to assess the climate impact is FGLS (cross-section Seemingly Unrelated Regression) with one-way fixed effect panel model specification with the districts fixed effects. The chapter is designed to discuss the estimated parameters and also comments on the results in order to link them with chapter seven.

6. RESULTS

6.1. Parameters Estimated

The study has taken into account forty points of time and eleven districts of Punjab. The panel fixed effect model for cross section can capture more information on heterogeneity among districts. Feasible Generalised Least Square (FGLS) with cross section SUR technique has been used to run the panel regression.

Table 6 shows the FGLS (cross section SUR) model results of all the independent, dependent (climate and non climate), t-statistics R-squared, F-test and other relevant statistics. For estimation, quadratic forms of climate variables have also been considered with linear form. Taking quadratic form is consistent with the literature[7]. Quadratic forms were taken into account to capture the possibilities of nonlinearities in climate sensitivities. The linear term of climate variables show the marginal value of climate at the land price mean, while the quadratic terms show the nature of the relationship among climate variables and land value as given under:

- A positive coefficient shows a U shape while negative coefficient depicts a hill shape ($\cap$) relationship among climate variables and land values.
- U shape relationship indicates that land prices will decrease with increase in climate variables to a certain point (minimum of U), then both land prices and climate variables will increase.
- Hill shape ($\cap$) relationship indicates that as climate variables increase the land value also increases to a certain degree (maximum of $\cap$), departure from this point will lead to reduction in land values with an increase in climate variables.

As noted from the result, C being the constant term, in fixed effects model; the constant term contained all fixed effects. Table 6 Shows Panel Estimation Results: with FGLS (cross section SUR) technique.

[7]See Section 2.

Table 6

Panel Estimation Results: FGLS (Cross Section SUR)

Variables	Coefficients
Climate	
Rabi precipitation	–877.11**
Rabi precipitation Squared	8.50***
Kahrif precipitation	168.92***
Kharif precipitation Squared	–1.17***
Minimum Rabi Temperature	–3868.66****
Minimum Rabi Temperature Squared	162.93***
Minimum Kharif Temperature	6088.82****
Minimum Kharif Temperature Squared	–188.81***
Maximum Rabi Temperature	26085.60***
Maximum Rabi Temperature Squared	–438.47***
Maximum Kharif Temperature	–3003.86
Maximum Kharif Temperature Squared	13.03
Non-climate (control)	
Population Density	30.84*
Area under Cultivation	1.058
Income Per Capita	54.79*
Constant	–294035.2
LPRICE(–1), Lag of Dependent Variable	0.915*
District Fixed Effects	
Bhawalpur	–52453.99
Bhawalnagar	19507.44
Faisalabad	35039.85
Rawalpindi	124067.6
Jehulm	32901.58
Lahore	–64938.94
Mianwali	–15004.54
Multan	–22576.11
Rahim Yar Khan	–38415.25
Sargodha	17444.15
Sialkot	3443.14
R^2	0.93
Adjusted R^2	0.92
F-statistics	215.56
Akaike Information Criterion	24.99
Schwarz Criterion	25.09
Durban-Watson Statistics	2.06

*Denotes 1 percent, ** 5 percent, *** 10 percent, and ****15 percent.

6.2. Climate Variables

Precipitation has been a very important variable in agricultural sector of Punjab.

Mean Rabi precipitation has shown a U shape relationship (U) with land prices. It has revealed that increase in precipitation in Rabi season will decrease land price. Precipitation is significant at 5 percent level of significance.

Mean Kharif precipitation also has significant relationship with land values. The relationship is of hill shaped (∩) relationship. It has revealed that with an increase in Kharif precipitation, land prices will increase. The results have been in accordance with expectations. Kharif crops have been sensitive to more precipitations. Especially, rice a major Kharif crop is water demanding crop.

Mean minimum Rabi temperature had a significant relationship with land prices. It had shown U shape relationship with land prices. With an increase in mean minimum Rabi temperature, land price will decrease. It was significant at 10 percent level of significance.

Mean minimum Kharif temperature has a significant hill shaped (∩) relationship with land prices. It indicates that with increase in mean minimum Kharif temperature, land prices will also increase. It is significant at 25 percent level of significance.

Mean maximum Rabi temperature has a significant hill shape (∩) relationship with land prices. It reveals that with increase in mean maximum Rabi temperature, land prices will also increase. It was significant at 10 percent level of significance.

Mean maximum Kharif temperature has U shape relationship with land prices, but this relationship is not found to be significant.

Table 7

Comparison of Kharif and Rabi Climate Variables and Relationship with Land Price Dependent Variable

Kharif	Rabi
Precipitation had significant hill(∩) relationship with land prices	Precipitation had significant U relationship with land prices
Mean minimum temperature observed significant hill shape (∩) relationship with land prices.	Mean minimum temperature had significant U shape relationship with land prices
Mean Maximum temperature had insignificant U shape relationship with land prices.	Mean Maximum temperature had significant hill shape (∩) relationship with land prices.

Rasul, *et al*. (2009) had found that in Punjab minimum temperature had increased significantly over the period 1960–2007. Mean minimum temperature of both Kharif and Rabi has significant relationship with land prices in the current study also. Precipitation had found to have increased during 1960-2007 in Punjab [Rasul, *et al.* (2009)]. FGLS model results have confirmed the fact by showing significant relationship of precipitation with land prices both in Kharif and Rabi season.

It has also been found that in Punjab maximum temperature had not increased significantly during 1960–2007 [Rasul, *et al*. (2009)].

One important parameter that Rasul (2009) had taken into account was the annual mean minimum, maximum and precipitation. Study in hand required to quantify the economic impact of climate change on agricultural sector, therefore, mean maximum, minimum and precipitation split the annual climate variables into two sowing and harvesting seasons i.e. Kharif and Rabi. FGLS model results show that mean maximum temperature do not have significant relationship with land prices, while mean of maximum Rabi temperature has hill shaped (∩) relationship with land prices. The study on climate change and wheat production by Global Change Impact Study Centre (2010), had brought that wheat production will increase with the increase in temperature. Wheat is Rabi crop, mean maximum Rabi temperature has significant hill shape (∩) relationship with land prices in study in hand. It can safely be deduced that with increase in Rabi mean maximum temperature, wheat production will increase.

Direct interpretation of the regression coefficients within the land climate Hedonic pricing/Ricardian approach is not tenable for specific impact on crop yield. However, based upon the model results, direction of the signs of the coefficients and nature of the relationship, educated speculations to some extent can be made.

Kharif precipitation has hill shape (∩) relationship with land values. As moisture soil will increase crop production. Rabi precipitation is not as much demanding as of Kahrifs', Rabi precipitation has negatively related to land values, it can be speculated that increase in Rabi mean precipitation will decrease crop yield of wheat. On the other hand, mean maximum Rabi temperature is significant, has positive sign which shows increase in mean maximum temperature will increase crop yield as wheat needs heat for maturation. The results have indicated that Rabi season is winter and partly spring low precipitation and high temperature will tend to reduce risks of fog and frost in Punjab. Both low precipitation and high temperatures are conducive for crop maturation.

6.3. Marginal Climate Impacts

In Section 6.3, there is interpretation of linear coefficients (constant slopes) and squared coefficients (non linear slopes which are a function of climate variables). It is not possible to capture the magnitude of the impact of climate variables with linear and squared coefficients individually. Marginal climate impact (MCI) for each set of climate variables (linear and squared coefficients) jointly has been calculated to capture the magnitude of the impact of climate variables on agricultural land price. Recalling from discussion 6.2, if land prices are expressed in quadratic function of climate variables, the partial derivative of the dependent variable land price (LPRICE) with respect to climate variables would be

$$\partial LPrice/\partial Climate = \beta_2 + \beta_3 Climate \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6.1)$$

By taking the mean of both sides

$$E\,(\partial LPrice/\partial Climate) = E\,(\beta_2 + \beta_3 Climate) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6.2)$$

Which is (Equation 6.2) is MCI for any climate variable. Marginal climate impact is the magnitude of change in any climate variable. In this section, marginal climate impacts represent the change in Pak Rs/acre of agricultural land prices per ^{0}C or mm/Kharif and marginal climate impact represent the change in Pak Rs/acre of

agricultural land prices per ^{0}C or mm/Rabi climate for agricultural land in the Punjab province. Equation 6.2 can be calculated based upon the numbers from the estimation results. It can be tested as a restriction for FGLS (cross section SUR) model. To investigate the level of significance of estimated marginal climate impact, F-test is being run [Amiraslany (2010)]. The significance of F-test also checked. Marginal Climate impacts of all climate variables are presented in Table 8.

Table 8

Marginal Climate Impacts

Variables	β_2	β_3	SD	MCI	F.statistic
Rabi Precipitation	–8.77.11	8.5033	313.45	-860.10*	7.59
Kharif Precipitation	168.92	–1.171	97.34	166.577**	2.92
Minimum Rabi Temperature	–3868.66	162.93	2888.460	–3542.79	1.50
Minimum Kharif Temperature	6088.823	–188.81	5090.83	5711.20	1.258
Maximum Rabi Temperature	26085.60	–438.4713	146557.29	25208.66**	2.957
Maximum Kharif Temperature	–3003.86	13.03	61709.92	–2977.78	0.0023

*****Denotes significant at 5 percent, and **Denotes significance at 10 percent level.

The MCI results show that with an increase in precipitation of 1 mm in Rabi season, agricultural land price will decrease, on average, by 860 Pak Rs per acre in Rabi season, while the same increase (1 mm precipitation) in Kharif season will bring increase in agricultural land price, on average, by 166.58 Pak Rs per acre in Kharif season. The resulted signs of coefficients are in according to expectations. As stated earlier, Kharif crops (e.g. rice) are more water demanding as compare to Kharif crops. Therefore, an increase in precipitation Kharif will lead to an increase in land prices.

On the other hand, MCI analysis of maximum Rabi temperature shows that with a 1 ^{0}C increase in maximum temperature, agricultural land prices, on average, will increase by 25208.66 Pak Rs in Rabi season.

The results and expected signs are in accordance with expectations. One major Rabi crops is wheat, which needs much warmer climate for maturation.

The expected signs and direction of relationship of maximum Kharif temperature, minimum Rabi and Kharif temperature are according to expectations, but marginal impacts of these climate variables are not significant. It is important to recognise that these results can be interpreted only with educated speculations for agricultural yield and crop productivity. As only land price might not reflect the agricultural yield and crops productivity. There are some other regional differences (non climate and non agricultural) that might affect the land prices also. Irrigation, soil fertility etc. are some of those factors that directly and indirectly might affect the land prices.

6.4. Non-climate (Control) Variables

As stated earlier, that some factors other than climate have been considered important in influencing the land prices. The practice of using control variables is consistent with other land Climate Hedonic Pricing/ Ricardian studies. In the study in hand, one different variable is used that is the area under cultivation (000 hectares) at the district level. The rationale for which is that if Rabi is getting warmer and precipitation is decreasing, some uncultivated land (marginal land) can be taken under cultivation. It also

shows that soil moisture and other environmental conditions (e.g. low risk of frost and fog) are suitable to take marginal land under cultivation. The year wise values of area under cultivation for crops and orchards were taken in 000 hectares at the district level. Population density and per capita income were also included as control variables to avoid any misspecification error (omitted variable bias).

The parameter of population density is positive and strongly significant with land prices. It has revealed that agricultural land prices will rise with rise in population. It also has revealed that land is a fixed factor of production, as population increases, demand for food grains rises, and demand for agricultural land also rises. Therefore, land prices will rise with rise in population. Per capita income shows the purchasing power of people. Per capita income has positive sign and significant relationship with land prices. It shows that rise in per capita income will lead to rise in land prices.

Area under cultivation coefficient has positive sign but is not significant. It shows that any change in hectares of area under cultivation has no influence on land prices.

6.5. Districts Fixed Effects

The concept of including districts fixed effects has been presented in the chapter five. The district fixed effects can absorb unobserved time invariant determinants of land prices. The negative district coefficients show lower land values as compared to the positive district coefficients. The heterogeneity among the co-efficient of land values under fixed effects is due to unobserved factors. The unobserved and missing factors such irrigation, fertility of land etc. are not included in the model.

One very interesting result is the fixed negative effect coefficient for Lahore district, which is the provincial headquarter and centre of education, cultural, business and trade activities, The reason for which can be traced rapid urbanisation (unobserved) might be one reason. In Lahore, Most of agricultural land has been turned into residential housing colonies to meet the ever rising demand of houses.

6.6. Overall Model Results

R-square value is 0.93. It shows that 93 percent variation in the dependent variable is explained by explanatory variables (climate and non climate). F-statistic shows that joint significance of explanatory variables with dependent variable average agricultural per acre agricultural land price is highly significant. Different specifications of the model are estimated and the best model is reported. The FGLS estimation technique is used for the estimation of fixed effect model which is selected on the basis of minimum Schwarz and Akaike information criteria. As it was expected, the presence of autocorrelation and heteroscedasticity problems FGLS technique is used to take care of these problems. One lag of dependent variable is also used to capture inertia in the land prices.

7. CONCLUSION AND POLICY RECOMMENDATION

The objective of the study was quantification of impacts of change in climate normals to have a variable and sustainable development of agricultural sector both at the regional and country level. In this direction the study has gone to confirm the premises that climate change impinches considerably agricultural production and also price of

agricultural land. In other words, if there is a decrease/increase in value of agricultural land due to climate change.

One of other distinct features inducted in the study are inclusion of Kharif and Rabi climate variables. This had not been in earlier studies. The two seasons are crop sowing and harvesting in Punjab and at the country level. Precipitation in Kharif season has significant positive ($\cap$), mean minimum Kharif temperature has significant positive ($\cap$) relationship with land prices. Mean maximum Kharif temperature is not significant with land prices. With respect to precipitation, it is found that an increase of one mm in precipitation, the land price on an average will increase by Pak Rs 166.577 per acre in Kharif season.

Precipitation in Rabi has significant negative (U) relationship, Mean minimum temperature has significant negative (U) and mean maximum Rabi temperature has significant positive ($\cap$ shaped) relationship with land prices. Results have indicated that with decrease in Rabi precipitation coupled with an increase in maximum Rabi temperature will tend to increase the land price in the this season.

Population density and per capita income have positive relationship with land prices. Both these are very important control variables, and highly significant with price of land. The overall variables namely climate and non climate results explain in 93 percent variation in land prices as revealed by R^2 value.

The marginal climate impact is measured to capture the magnitude and also to check the joint significance of linear and squared coefficients of climate variables. Results have shown that in Rabi season, an increase in precipitation of one mm, agricultural land price, on an average, will decrease by Pak Rs 860 per acre. An increase in maximum temperature by 1^0C will increase agricultural land price, on an average, by Pak Rs 25208.66 per acre.

7.1. Policy Implications

It has come out that all the climate variables, except maximum temperature, have highly significant relationship with land prices. Climate change is imposing cost, at the same brings-in benefits of increase in land prices in Rabi season due to increase in maximum temperature. Benefits show adaptation made by farmers in changing climate which leads to increase in long run net revenues.

The increase in precipitation in Kharif season tends to increase in land value. The increase in precipitation in Rabi season results in loss from decrease in production. The increase in mean minimum Rabi temperature being negatively significant imposes cost to agricultural sector with increase in temperature in this season. It is for the planners to evolve policies that benefits are maximised and costs are minimum as a result of climate change. To minimise cost, research and development pursuits of the concerned public and private institutions may be encouraged to develop heat and drought resistant varieties of currently cultivated crops. Incentive policies should be framed by policy makers for farmers to make switching from current varieties to the developed ones quickly happen. There should be flow of information at zero cost about changing climate for stakeholders.

7.2. Study Limitations

In order to interpret the results correctly, the limitations need to be identified. The limitations arise primarily, due to non-availability of the requisite data. Data on irrigation was not taken in the model as these are not maintained by the irrigation authority on district level. The data are at the barrage or canal head level. The data on soil fertility and slope was also not used as GIS data is not tailored in according to requirements for time series.

Land price data obtained from Mutation register of Patwaris' at the district level which is very volatile. Research studies may be done by future researchers for other regions of the country also in the area of economic impact assessment. Cross sectional research studies may also be done as they use micro level household data for impact assessment.

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Impact of Climate Change on Wheat Production: A Case Study of Pakistan

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1. INTRODUCTION

Atmospheric condition which remains for some days is called weather, whereas, if such condition prevails for a season, decade or a century, it is termed as climate. To keep the pace of growth fossil fuel has been used in order to meet the energy requirement. However, fossil fuel adds some gases in the atmosphere which are altering the climate with the passage of time.

1.1. Climate Change

Climate change refers to "change in climate due to natural or anthropogenic activities and this change remain for a long period of time." [IPCC (2007)]

The gases responsible for the global warming are known as Greenhouse Gases (GHGs), which are comprised of Carbon Dioxide ($CO_{2)}$, Methane ($CH_{4)}$, Nitrous Oxide (N_2O) and water vapors. These gases are produced by a number of anthropogenic activities (Motha and Baier). CO_2 is mainly produced during the combustion of wastes, carbon, wood and fossil fuels. Methane is produced during the mining of coal, gas and oil and during their transportation, whereas, Nitrous Oxide is produced during agricultural and industrial activities.

Man is responsible for this newly emerging CO_2 enriched world because since the pre industrial time CO_2 concentration has increased from 280ppm[1] to 380ppm due to deforestation, massive use of fossil fuels etc. [Stern (2006)] Concentration of GHGs as a result of anthropogenic activities are increasing at a rate of 23ppm per decade, which is highest rise since the last 6.5 million years. Percentage contribution of different sectors in the atmospheric concentration of GHGs is from energy sector 63 percent, agriculture 13 percent, industry 3 percent, land use and forestry 18 percent and waste 3 percent [Rosegrant, *et al*. (2008)]. Climate change is an externality which is mainly caused by

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[1]PPM means parts per million. It is used to measure the level of pollution in air. It is a ratio between pollutant components and the solution.

particular economic activities, and the geographical position of many developing countries makes them very much vulnerable to climate change. According to the IPCC prediction, in the absence of any policy to abate the GHGs emission, GHGs would increase from 550ppm to 700ppm at the mid of current century and this level of GHGs would cause to accelerate the temperature from 3^{o}C since the pre industrial era to 6^{o}C. (Stern 2006).[2]

Earth gains solar energy from sun in the form of sun light, and the atmosphere, which is composed of different GHGs, holds these energy rays and passes them on to the earth and then let them to go back into the space. So the atmosphere plays a vital role to maintain the earth's average temperature at a level of 15^{o}C [Edwards (1999)].

Global warming is a real issue which is directly caused by the higher level of CO_2 in the atmosphere, whereby GHGs trap the sun rays and do not let them go back to space. Higher level of CO_2, produced by anthropogenic activities, intensifies concentration of GHGs, traps more light and causes to increase earth's overall temperature [Brown (1998)]. Some of the consequences of global warming may appear in the form of more frequent floods and drought, food shortage, non supporting weather conditions, newly born diseases, sea level rise, etc. The concentration of these GHGs are mounting in the atmosphere through number of ways like anthropogenic activities, deforestation etc. It is expected that up to 2100 this concentration would become 3 times as much as the pre-industrial time causing 3 to 10^{o}C hike in temperature [Tisdell (2008)].

1.2. Possible Effects of Climate Change on Agriculture

Agriculture is the most vulnerable sector to climate change. Agriculture productivity is being affected by a number of factors of climate change including rainfall pattern, temperature hike, changes in sowing and harvesting dates, water availability, evapotranspiration[3] and land suitability. All these factors can change yield and agricultural productivity [Harry, *et al.* (1993)]. The impact of climate change on agriculture is many folds including diminishing of agricultural output and shortening of growth period for crops. Countries lying in the tropical and sub tropical regions would face callous results, whereas regions in the temperate zone would be on the beneficial side.

Wheat plant's stalk is normally 2 to 4 feet high and having grass like leaves each of which is normally 8 to 15 inches in length. The top of each stalk is having a spike which is normally 2 to 8 inches in length, it is the grain rich part of wheat plant, each spike contains 20 to 100 kernels (grains) whereas, some spike contains up to 300 kernels depending upon the climate conditions. According to Zadoks scale wheat has ten growth stages which are germination, main stem leaf production, tiller production, stem elongation, booting, heading, anthesis, grain milk stage, grain dough stage and ripening. Winter plants require minimum temperature of 5 to 10^{o}C in order to come out of the dormancy period, and hence wheat, which is a winter crop, also requires long cold season in order to hasten plant development before flowering occurs, so higher temperature delay the vernalisation process in wheat [Chouard (1960)].

[2]For international efforts to abate GHGs see Appendix-1.

[3]The sum of evaporation and plant transpiration from the surface of the earth to the atmosphere.

CO_2 is regarded as the driving factor of climate change, however its direct effect on plant is positive [Warrick (1988)] CO_2 enriches atmosphere positively and affects the plants in two ways. First, it increases the photosynthesis process in plants. This effect is termed as carbon dioxide fertilisation effect. This effect is more prominent in C3 plants because higher level of CO_2 increases rate of fixed carbon and also suppresses photorespiration.[4] Second, increased level of CO_2 in atmosphere decreases the transpiration[5] by partially closing of stomata and hence declines the water loss by plants. Both aspects enhance the water use efficiency of plants causing increased growth.

The crops which exhibit positive responses to enhanced CO_2 are characterised as C3 crops including wheat, rice, soybean, cotton, oats, barley and alfalfa whereas, the plants which show low response to enhanced CO_2 are called C4 crops including maize, sugarcane, sorghum, millet and other crops.

Warrick study for USA, UK and Western Europe regarding the impact of increase in temperature on the wheat productivity indicates that impact of increase in temperature is catastrophic in terms of yield losses because higher temperature accelerates the evapotranspiration process creating moisture stress [Warrick (1988)]. It also shorten the growth period duration of wheat crop and this becomes more severe regarding yield losses if it occurs during the canopy formation because less time will be available for vernalisation process and the formation of kernels. Wetter conditions are beneficial for wheat yield whereas drier are harmful and cause to decrease the productivity.

In Pakistan wheat is sown in winter season, preferably in November. Estimated land, on which wheat is cultivated in Pakistan, is 9045 thousand hectare and per hectare wheat yield is 2657 kg. [Khan, *et al*.]. Per head consumption of wheat in Pakistan is about 120 kg which makes the importance of this food crop. The water available for the cultivation of wheat in Pakistan is 26 MAF (million acre feet) which is still 28.6 percent lower than the normal requirement of water [Rosegrant, *et al*. (2008)]. Almost all the models predict that climate change will stress the wheat yield in South Asian region. According to the 4^{th} IPCC report cereal yield could decrease up to 30 percent by 2050 in South Asia along with the decline of gross per capita water availability for South Asia from $1820m^3$ in 2001 to $1140m^3$ in 2050. Water supply is scarce in many part of the country. In near future a dramatic decline in the water availability would cast a sharp decline towards the production of agricultural productivity.

1.3. Objectives of Study

The primary purpose of this study is whether the global warming negatively affects the wheat production in Pakistan. More specifically, what has been the impact of change in temperature and precipitation on the wheat production in Pakistan? How far possible future changes in temperature and precipitation may affect the level of wheat production in Pakistan? Moreover, along with core variables of temperature, precipitation, carbon dioxide, area under wheat cultivation and water, the study also aims to investigate the role of a number of other variables on the wheat production of Pakistan.

[4]A process that displaces newly fixed carbon.

[5]Loss of water by plant during exchange of gases.

1.4. Scope and Limitation of Study

This study assumes Pakistan as a homogenous region.[6] It considers two basic variables of climatic change, namely temperature and precipitation. It does not consider the impact of climatic change on wheat production through humidity due to non-availability of wide range of time series data about the level of humidity in Pakistan. In context of dependent variable, scientists sometimes consider yield (per unit output) in place of total output to investigate the impact of various independent variables. However, this study does not consider yield due to non-availability of data on various factors (including different features of soil, etc.) that may influence yield.

2. LITERATURE REVIEW

Warrick (1988) investigated that at higher level of CO_2 in the atmosphere, C3 crops specially wheat would show improvement in water use efficiency through less transpiration, in such case at $2\times CO_2$ concentration level (680ppm) wheat production would be increased 10 percent to 50 percent for mid and high latitude region of Europe and America. However, 2^oC increase in temperature would decrease the production by 3 percent to 17 percent which might be offset by higher level of precipitation. He analysed that for each ^oC increase in temperature would cause to shift the geographical location for crops production to several hundred kilometers towards mid and high latitude.

Lobell, *et al*. (2005) used CERES-Wheat simulation model for the climate trend effect on wheat production in the Mexico region. They studied the climate trend and wheat yield for the last two decades from 1988 to 2002. They found that the climate had favoured during the two decades and resulted in 25 percent increase in wheat production. It means climate was having positive effect on the wheat yield for this region. However 25 percent increase is less as compared to the previous studies which predicted higher increase in wheat productivity for this region.

Xiao, *et al*. (2005) carried out the investigation in order to check the effect of climate variability on high altitude crop production and to check whether the wheat yield at high altitude could be affected by the climate variability. For this purpose they selected two sites, Tonguei Metrological station 1798m above the sea level and Peak of Lulu Mountains 2351m above the sea level. They investigated the effect for the time period from 1981 to 2005. Their results showed that yield of both the sites increased during this period bearing positive change in temperature and precipitation. Initially up to 1998 yield of two altitudes was high but after that yield of high altitude showed an increasing trend as compared to loss at low altitude. The simulated results up to 2030 also showed that the agriculture production of wheat for low altitude would increase by 3.1 percent and that of high altitude would increased by 4.0 percent.

Hussain and Mudasser (2006) used Ordinary Least Square (OLS) method to assess the impact of climate change on two regions of Pakistan, Swat and Chitral 960m and 1500m above the sea level, respectively. They investigated whether increase in temperature up to 3^oC would decrease the growing season length (GSL) of the wheat yield of this county. Their result showed that increase in temperature would create

[6]Most of the area under wheat cultivation lies in the plain regions of Indus valley having similar climatic conditions.

positive impact on Chitral district due to its location on high altitude and negative impact on Swat because of its low altitude position. An increase in temperature up to 1.5°C would create positive impact on Chitral and would enhance the yield by 14 percent and negative effect on Swat by decreasing its yield by 7 percent. A further increase in temperature up to 3°C would decrease the wheat yield in Swat by 24 percent and increase in Chitral district by 23 percent. They suggested adaptation strategies of cultivating high yielding varieties for warmer areas of northern region of Pakistan because of expected increasing temperature in the future.

Tobey, *et al*. (1992) used SWOPSIM statistical world policy simulation based on General Circulation Model (GCM). The model used by them is static in nature in the sense that it presents only on spot effect of doubling of CO_2 on global agriculture. The model used 20 agriculture commodities. According to their result the negative impact of climate change on some region would not sabotage the world agriculture market rather this negative impact would be counterbalanced by agriculture yield of some other region which would experience positive impact of the global warming of climate change.

Zhang and Nearing (2005) used Hardley Centre Model (HadCM3) for their study about the wheat productivity in Central Oklahoma. They used three scenarios A2a, B2a and GGal for the current time period (1950–1999) and future time period (2070–2099). The simulations model projected that annual future precipitation would decrease by 13.6 percent, 7.2 percent and 6.2 percent for the three said scenarios respectively, whereas temperature would increase by 5.7°C, 4°C and 4.7°C respectively. They concluded that the short of rainfall in summer and not in winter will affect the yield whereas effect of increased temperature will be offset by the carbon fertilisation.

Winters, *et al*. (1996) analysed the impact of global warming on the archetype structure for Africa, Asia and Latin America. They used Comparable General Equilibrium (CGE) model for their study. They concluded that these entire three regions will face agriculture loss in cereal and export crops and hence income losses. They said that Africa would be the most negatively affected by this climate change because its economy is relying very heavily on agriculture output. They investigated that higher substitution possibility for increase in import cereal could do more to reduce income losses and development efforts regarding production of export crops in order to generate foreign exchange.

Gbetibouo and Hassan (2004) employed Ricardian model on wheat, sorghum, maize, sugarcane, ground nut, sunflower and soybean for the South African region. They found that temperature increase would be having positive impact on the agriculture production of maize, sorghum, sunflower, soybean whereas it would be having negative impact on sugarcane and wheat productivity. They concluded that this region is already having high temperature and any further increase in temperature in future due to climate change would havoc the wheat productivity. They suggested replacing wheat by maize and sorghum or other heat adapted crops in order to avoid possible loss of yield due to increased temperature.

Wolf, *et al*. (1996) compared five wheat models designed for Europe at different levels of agronomic conditions.[7] They concluded that almost all the models predicted the

[7]The models AFRCWHEAT2, CERES-Wheat, N-WHEAT, SIRIUS-WHEAT, and SOILN-wheat were designed for Rothamsted, UK and Sevelle, Spain.

same results. Their results showed that temperature increase would result in yield reduction whereas increased level of precipitation and CO_2 fertilisation would have positive impact on the production of wheat for Europe.

Anwar, *et al*. (2007) used the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO's) global atmospheric model under three climate change scenarios which were Low, Mid and High for the time period of 2000-2070 for South-East Australian location. Their results showed that for all the three scenarios the medium wheat yield declined by about 29 percent, however positive affect of CO_2 reduced this decline in production from 29 percent to 25 percent. CO_2 fertilisation affect offset a very small level of low rain fall and higher temperature. They suggested that higher yield productivity could be made through better agronomic strategies and breeds of wheat.

Cerri, *et al*. (2007) used simulation model for Central South region of Brazil up to 2050. They revealed that 3^oC to 5^oC increase in temperature and 11 percent increase in precipitation would cause to decrease the productivity of wheat to the level equal to one million ton of wheat. They ascertained that in Brazil wheat was being cultivated at the threshold level of temperature and any further addition to this level of temperature would cause to decline agricultural production specially wheat. They further concluded that most of the developing countries lying on the tropical belt and relying on agriculture would face losses in agricultural yield.

Zhai, *et al*. (2009) used comparable general equilibrium (CGE) model in order to examine the impact of climate change on agriculture sector of China in 2080. Their results showed 1.3 percent decline of agricultural share in GDP. The CGE simulation results showed that in 2080 agricultural output would become slow which ultimately leads to output losses except wheat which showed enhancement in output because of increase in global wheat demand. The simulation results also showed that as compared to world average agricultural production the agricultural productivity in China would decline less.

Zhai and Zhuang (2009) made a study on Southeast Asian region to investigate the economic impact of climate change on the said region by suing CGE model. According to them impact is not consistent throughout the world and developing countries would face large losses. According to the simulation results made by them up to 2080 Southeast Asia would face 1.4 percent decline in GDP. Crop productivity would fall up to 17.3 percent, whereas, the agriculture productivity of paddy rice would fall 16.5 percent and that of wheat up to 36.3 percent. In future, the Southeast Asian countries' dependency on import of these agricultural products would increase creating more welfare losses and hence weakening the term of trade of this region.

3. METHODOLOGY

3.1. Vector Auto Regression (VAR) Model

Vector autoregressive model (VAR) was developed by Sims (1980). Christopher Sim and Litterman urged that it is better to use VAR model for forecasting instead of structural equation model. VAR model superficially resembles simultaneous equation modeling in that we consider several endogenous variables together. But each endogenous variable is explained by its lagged or past values and the lagged values of all

other endogenous variables in the model. Usually there is no exogenous variable in the model. Sim developed VAR model on the basis of true simultaneity among the exogenous and endogenous variables. All variables used in this model are endogenous and believed to interact with each others.[8]

3.2. General From of VAR Model

The general form of VAR model in the matrix form is as follows:

$$\begin{matrix} y_t \\ y_{t-1} \\ --- \\ y_{t-p+1} \end{matrix} = \begin{matrix} \mu \\ 0 \\ --- \\ 0 \end{matrix} + \begin{matrix} \Gamma_1 & \Gamma_2 & --- & \Gamma_p \\ I & 0 & & 0 \\ --- & --- & --- & 0 \\ 0 & --- & I & 0 \end{matrix} \begin{matrix} y_{t-1} \\ y_{t-2} \\ --- \\ y_{t-p} \end{matrix} + \begin{matrix} \varepsilon_t \\ 0 \\ --- \\ 0 \end{matrix}$$

However, in the equation form the model can be expressed as follows:

$$y_t = \mu + \Gamma_1 y_{t-1} + \text{-------} + \Gamma_p \; y_{t-p} + \varepsilon_t$$

Or

$$\Gamma(L)\, y_t = \mu + \varepsilon_t$$

Where $\Gamma(L)$ is matrix of polynomial in lag operator.

The specific form of the model which we used for our study is as follows;

Wheat Production = f (Temperature, Carbon dioxide, Precipitation, Agricultural Credit, Wheat Procurement Price, Fertilisers takeoff, Technology, Land under wheat cultivation, Water availability) + Ui

$$W_p = \beta_0 - \beta_1 CO_2 + \beta_2 T_{emp} + \beta_3 Precip + \beta_4 A_{crdt} + \beta_5 W_{pp} + \beta_6 F_{ert} + \beta_7 T_{ech} + \beta_8 Lw + \beta_9 Wa + Ui$$

$$Wp = \alpha_1 - \alpha_2 Temp_{t-1} + \alpha_3 Prepcip_{t-1} + \alpha_4 Wp_{t-1} + \varepsilon_1 \qquad \varepsilon_1 \sim N(0, \delta 2)$$

$$Temp = \beta_1 + \beta_2 Wp_{t-1} + \beta_3 Prepcip_{t-1} + \beta_4 Temp_{t-1} + \varepsilon_2 \qquad \varepsilon_2 \sim N(0, \delta 2)$$

$$Prepcip = \gamma_1 - \gamma_2 Temp_{t-1} + \gamma_3 Prepcip_{t-1} + \gamma_4 Temp_{t-1} + \varepsilon_3 \qquad \varepsilon_3 \sim N(0, \delta 2)$$

Data and Variables

Wheat production data is collected from different editions of Economic Survey of Pakistan. We consider the amount of wheat in thousand tons. The direct impact of carbon dioxide on the production of wheat is positive, as it enhances the water use efficiency of plants. The data regarding the CO_2 is collected data source from the website of Carbon Dioxide Information Analysis Centre and all emission estimates are expressed in thousand metric tons of carbon. Temperature assumed to be having negative impact on wheat productivity for the regions which lie on the tropical or near to the tropical regions. We consider temperature in Celsius degree centigrade. Data source is Metrological Department of Pakistan. Precipitation assumed to be having positive impact on the production of wheat. Our source of data for precipitation is Metrological Department of Pakistan. The gauge of precipitation is millimetre. Similarly, data source for other variables like agricultural credit, wheat procurement price, fertilisers offtake and technology, is Economic Survey of Pakistan.

[8]There might be certain indirect effect of wheat production on climate; however, our analysis is limited to the impact of climate change on wheat production.

4. RESULTS AND INTERPERTATION[9]

4.1. Unit Root and Cointegration Test

Before going to incorporate the Vector Autoregression (VAR) model we have to check the unit root of all the variables of our study. For this we apply Augmented Dicky-Fuller (ADF) test to our variables. The results of the ADF test are shown in the Table 1.

Table 1

Results of the Unit Root Test Statistics

Variables	Level	First Difference	Conclusion
Wheat	4.21966	–7.875017	I(1)
CO2	4.325126	–4.922875	I(1)
Temp	1.701159	–12.00938	I(1)
Precip	–0.435624	–13.86419	I(1)
Water	3.803203	–9.966595	I(1)
Area	1.760045	–11.79492	I(1)

The results in the Table 1 show that all the variables are non-stationary at conventional level as the observed values are greater than 5 percent critical values. However, all the variables of our study are stationary at first difference, because observed values of variables are less than the 5 percent critical values. From the results it is concluded that all the variables are integrated of order one.

We apply Johansen's cointegration technique which is multivariate generalisation of the Dickey-Fuller test. Johansen's technique uses Trace test and Max-Eigen test statistics. The results are obtained by using Eviews 5, AIC is used for choice of lag length and the optimal lag length is 1 (at first difference). Table 2 gives the results of the cointegration relationship.

Table 2

Johansen's Test for the Number of Cointegration Relationship

No. of CE(s)	Trace Statistics	5% CV	Max-Eigen Statistics	5% CV
None	79.46599	95.75366	29.9226	40.07757
At most 1	49.54339	69.81889	21.03386	33.87687
At most 2	28.50953	47.85613	17.70915	27.58434
At most 3	10.80038	29.79707	6.655616	21.13162
At most 4	4.14476	15.49471	3.158354	14.2646
At most 5	0.986407	3.841466	0.986407	3.841466

Results in Table 2 express that t-stat values are less than 5 percent critical values which exhibit that the null hypothesis of no co-integrating relationship is accepted at the conventional significance level. This is also confirmed by max-eigen statistics of no co-integrating relationship. And the absence of no co-integrating association necessitates application of VAR in first difference.

[9]PC application Eviews5 has been used for the purpose of estimation.

4.2. Results from Vector Autoregression (VAR) Model

The results of VAR model estimation to our core variables, namely wheat production (Wheat), carbon dioxide (CO_2), average temperature (Temp), average precipitation (Precip), agricultural land under wheat cultivation (Area) and water availability (Water) are shown in the following Table 3.[10]

Table 3

Estimation through VAR Model

Vector Autoregression Estimates
Sample (Adjusted): 1961 2009
Included Observations: 49 after Adjustments
Standard errors in ( ) and t-statistics in [ ]

	Area	CO2	Precip	Temp	Water	Wheat
Area(–1)	0.124842	–0.52507	0.004539	–0.001234	0.004142	0.028147
	–0.17774	–0.42893	–0.00326	–0.00043	–0.00128	–0.41724
	[0.70239]	[–1.22413]	[1.39243]	[–2.88007]	[3.24645]	[0.06746]
CO2(–1)	–0.038178	0.823331	–0.000274	–0.000108	5.52E-05	0.131691
	–0.02392	–0.05773	–0.00044	–5.80E-05	–0.00017	–0.05616
	[–1.59586]	[14.2610]	[–0.62529]	[–1.87557]	[0.32148]	[2.34497]
Precip(1)	14.38281	–81.90536	0.16735	–0.002084	0.007075	16.29369
	–8.89935	–21.4766	–0.16323	–0.02145	–0.06389	–20.891
	[1.61616]	[–3.81370]	[1.02522]	[–0.09714]	[0.11074]	[0.77994]
Temp(1)	40.76017	75.97065	–0.62428	0.61034	0.132138	265.6333
	–47.1042	–113.675	–0.86399	–0.11353	–0.33817	–110.576
	[0.86532]	[0.66831]	[–0.72256]	[5.37595]	[0.39075]	[2.40227]
Water(1)	10.96782	98.01159	0.164828	–0.003554	0.661926	95.77185
	–12.3892	–29.8987	–0.22724	–0.02986	–0.08894	–29.0834
	[0.88527]	[3.27812]	[0.72534]	[–0.11903]	[7.44210]	[3.29301]
Wheat(1)	0.181938	0.02629	–0.000935	0.000643	0.000564	0.186449
	–0.07976	–0.19249	–0.00146	–0.00019	–0.00057	–0.18724
	[2.28103]	[0.13658]	[–0.63915]	[3.34487]	[0.98579]	[0.99579]
C	2193.293	–1654.546	8.441518	10.23913	–3.072556	–7210.404
	–963.863	–2326.07	–17.6792	–2.32312	–6.91966	–2262.64
	[2.27552]	[–0.71131]	[0.47748]	[4.40749]	[–0.44403]	[–3.18672]
R-squared	0.900537	0.994282	0.187826	0.893184	0.989251	0.976617
Adj. R-squared	0.886327	0.993465	0.071801	0.877924	0.987716	0.973277
Sum sq. Resides	7034773	40969940	2366.709	40.86617	362.5677	38766060
S.E. Equation	409.261	987.6613	7.506678	0.98641	2.938123	960.7296
F-statistic	63.37758	1217.136	1.618842	58.53312	644.2508	292.3638
Log Likelihood	–360.4546	–403.6229	–164.5252	–65.0808	–118.5621	–402.2683
Akaike AIC	14.99815	16.76012	7.001027	2.942074	5.124982	16.70483
Schwarz SC	15.26841	17.03038	7.271287	3.212334	5.395242	16.97509
Mean Dependent	7049.531	16314.98	35.9642	18.41485	103.8781	12514.45
S.D. Dependent	1213.871	12217.37	7.791611	2.823207	26.50935	5877.001

[10]VAR model estimation results to other variables, namely agricultural credit (Ac), fertilisers offtake (Fr), technology (Te) and wheat procurement price (Wpp), are given in Appendix-2.

The statistical values of t-statistics for some of our variables are significant whereas for some of them is insignificant, but the higher value of F-statistics makes all the lag terms of our model statistically significant. The coefficient of determination R-squared values of our variables is lying between 0 and 1 which shows the goodness of fit of our model. We consider VAR model with lag 1 because the values of Akaike AIC and Schwarz Sc for the data using lag 1 is smaller than that of lag 2, lag 3 and lag 4, so the lower values Akaike AIC 16.70483 and Schwarz Sc 16.97509 for lag 1 make the model more parsimonious. Therefore, VAR model for lag 1 for the study is more preferable as compared to other lag values.

4.3. Prediction of Wheat for 2010

In order to estimate the predicted value for wheat production in 2010 using VAR technique for 1 lag values, the calculation is follows;

$$\begin{aligned} E\ (\text{Wheat } 2010) &= -7210.404 + 0.186449\ (\text{wheat } 2009) + 0.131691\ (CO_2\ 2009) + \\ &\quad 265.6333\ (\text{Avg. Temp2009}) + 16.29369\ (\text{Avg. Prep2009}) + \\ &\quad 95.77185\ (\text{Water } 2009) + 0.028147\ (\text{Area } 2009) \\ &= -7210.404 + 0.186449\ (24033) + 0.131691\ (48174) + 265.6333 \\ &\quad (22.6) + 16.29369\ (39.2) + 95.77185\ (142.9) + 0.028147\ (9046) \\ &= 24197.09 \end{aligned}$$

So the estimated production of wheat according to our calculation for 2010 is 24197.09 thousand ton, however the actual production of wheat in 2010 according to the government calculated figure was 23864 thousand ton [*Economic Survey* (2010)].

4.4. Results of Impulse Response Function

The objective of the impulse response function traces the effect of a one-time shock to one of the innovation on current and future values of the endogenous variables. The results of the Cholesky Impulse Response Function for our model are shown in Figure 1 and in Table 4.

Table 4

Cholesky Impulse Response Function

Period	Area	CO2	Precip	Temp	Water
1	547.6505	128.5776	89.04947	25.52728	13.30635
	–125.604	–112.014	–110.895	–110.499	–110.461
2	199.3847	120.2491	251.5133	187.6724	260.7115
	–149.547	–81.2038	–153.907	–111.358	–84.2251
3	273.3583	98.95197	101.1266	151.1796	262.7725
	–106.539	–73.5843	–110.064	–110.598	–68.4551
4	272.8148	94.79574	109.7557	156.5153	266.374
	–106.043	–80.4612	–111.075	–121.652	–68.4594
5	275.5361	91.83941	116.4325	161.4013	270.72
	–111.915	–87.6574	–119.489	–129.8	–72.1443
6	279.7032	89.408	121.5303	164.8469	273.917
	–117.516	–94.6738	–128.411	–136.443	–75.7086
7	283.4604	87.45754	126.5841	167.8656	276.8978
	–122.933	–101.391	–137.444	–141.63	–79.0905

Cholesky Ordering: Area CO2 Precip Temp Water Wheat.

The results in Table 4 depict that one standard deviation shock to area increases the wheat production by 547.6505 points but in second period production decreases to 199.3847 points and in next periods it shows little increase to this level. Similarly, one standard deviation shock to CO_2 increases the wheat production by 128.5776 but in second period the production increases 120.2491 points and so on. However, one standard deviation shock of temperature creates positive impact on the production of wheat and increases it by 25.5273 points in the first period and after that a significant increase of 187.6724 points in the second period and after that in each period the impact remains positive. The results also express that one standard deviation shock to precipitation increases the wheat production by 89.05 points, in the second period the impact becomes significant and increase the wheat production by 251.51 points. The results show that one unit shock to water increases the wheat production by 13.30635 points but in second period the impact becomes significant and increase the wheat production by 260.7115 points and after that in each period it creates positive effect on wheat production. The results of these innovations are portrayed graphically in Figure 1.

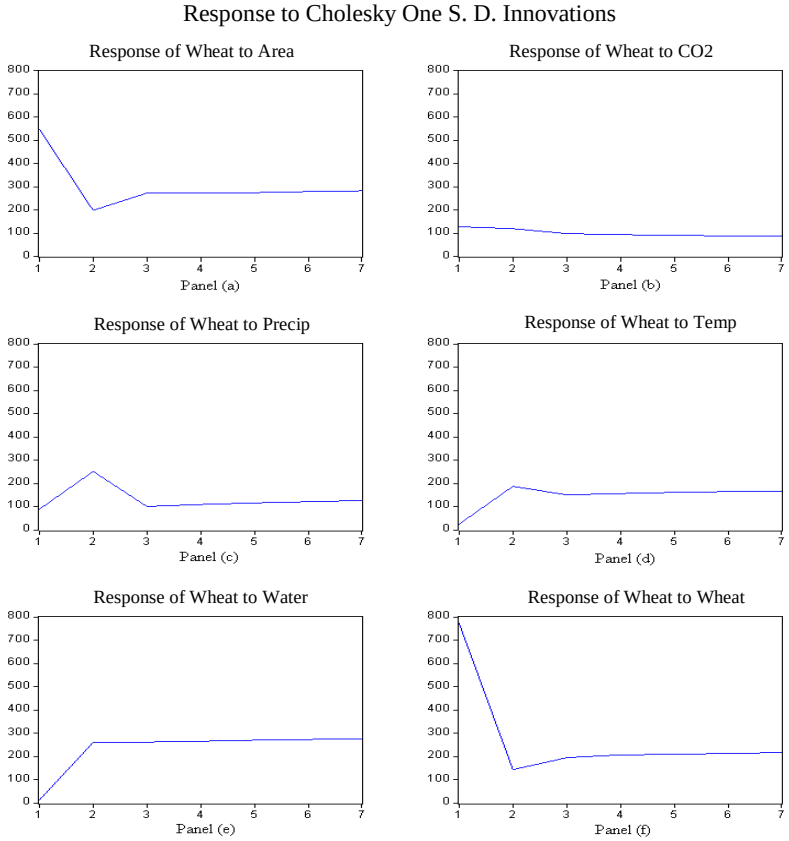

Fig. 1. Cholesky Impulse Response Function[11]

[11]Keeping in view the basic objective of the study, we are only representing the wheat impulse responses.

Figure 1 (panel a to f) shows the responses of wheat to one standard deviation shock to area, CO_2, precip, temp, water and wheat. Panel (a) demonstrates that the significant positive impact of area on wheat but after that the impact becomes insignificant. Similarly, in panel (b) CO_2 is creating positive impact on wheat which remains positive and insignificant. Panels (c & d) offer positive and significant impact of precip and temp on wheat in the initial periods. Thereafter the effect remains positive but insignificant. Similarly, panel (e) demonstrates that initially the impact of water is significant but after that the impact becomes insignificant.

4.5. Results from Variance Decomposition

Variance Decomposition or Forecast error variance decomposition shows the value each variable contributes to the other variables in a Vector Autoregression (VAR) model:

Table 5

Variance Decomposition

Period	S.E.	Area	CO2	Precip	Temp	Water	Wheat
1	409.261	32.49411	1.791134	0.859133	0.0706	0.019183	64.76584
2	474.4401	29.17053	2.661524	6.113525	3.080654	5.852353	53.12142
3	504.4951	29.82685	2.935434	5.859948	4.226994	9.874881	47.27589
4	527.3033	30.11328	3.065968	5.757519	5.126905	12.82279	43.11353
5	546.9704	30.28802	3.121553	5.739494	5.860545	15.09399	39.89641
6	564.2343	30.42154	3.132041	5.762170	6.455877	16.86583	37.36255
7	579.6429	30.52334	3.116208	5.815396	6.947042	18.27793	35.32009

Cholesky Ordering: Area CO2 Precip Temp Water Wheat.

Table 5 demonstrates percentage variation in wheat production due to other variables. In period one 32.5 percent of the variation is due to area under wheat cultivation and less variation due to CO_2 (1.79 percent), precipitation (0.85 percent), temperature (0.07 percent) and water (0.02 percent). In second period 29.2 percent of variation in wheat production is due to area under wheat cultivation whereas values of variations in wheat production due to CO_2, precipitation, temperature and water are 2.66 percent, 6.11 percent, 3.08 percent, 5.85 percent, respectively. The results show that in the second and following periods CO_2, precipitation, temperature and water are showing positive impact on wheat production. In the seventh period the values of the climate change variables cause 34 percent of variation in wheat production including water availability (18 percent), temperature (7 percent), precipitation (6 percent) and carbon dioxide (3 percent) whereas the share of area under wheat cultivation remains at about 30 percent.

The graphical representations of these results are expressed in Figure 2.

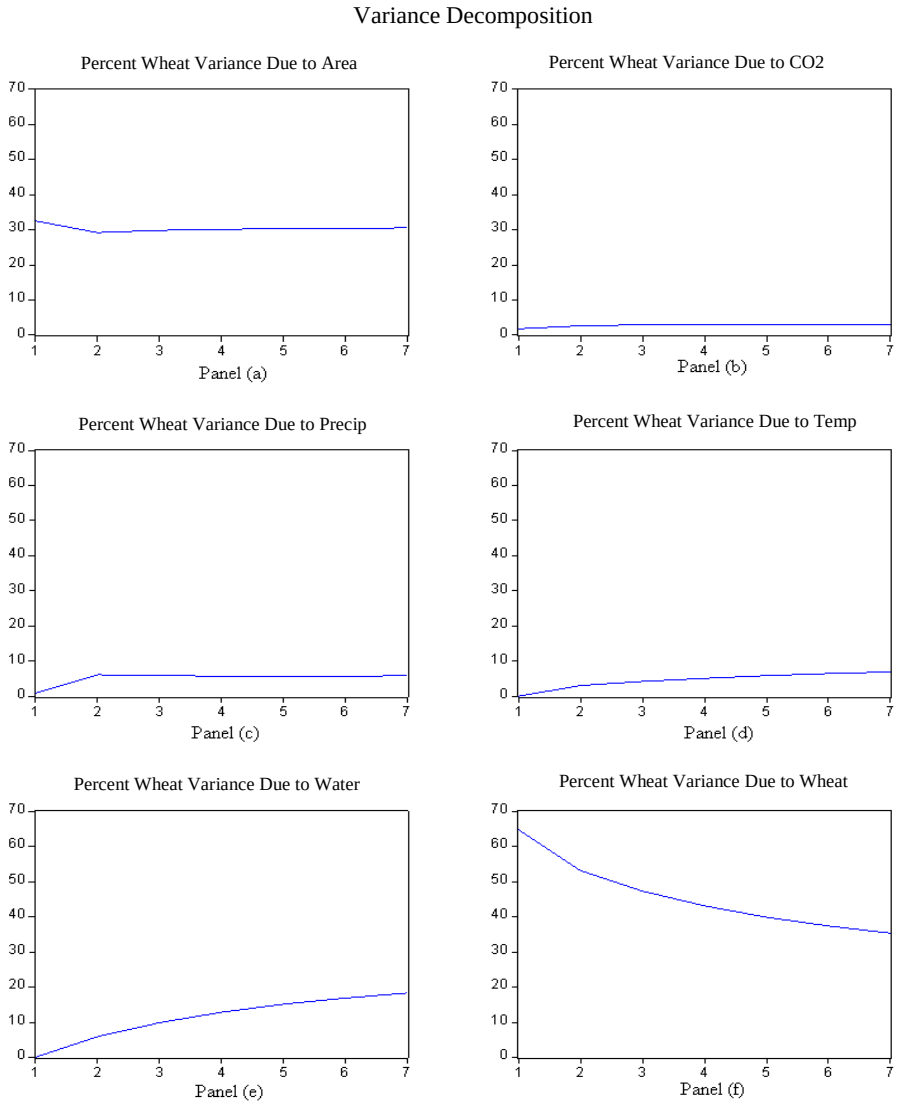

Fig. 2. Variance Decomposition

Almost all the results of our study are showing positive impact on the wheat production in Pakistan up to 2010. These results might appear contrary to the theoretical as well as empirical consideration of possible negative impact of global warming on the agricultural (wheat) production in the tropical and sub-tropical regions. However, following factors might be positively affecting the wheat production in Pakistan:

(1) Land under wheat cultivation is also increasing due to increased water supply and other factors which may be creating positive impact on the production of wheat.

(2) The pattern and direction of rain is changing worldwide due to climatic change. More rain and higher level of precipitation in the areas of wheat cultivation may have positively impacted the wheat production.
(3) Improvement in technology regarding new ways of cultivation, hybrid seeds, fertilisers, extension services and attractive procurement prices are also creating positive impact on the production of wheat.

4.6. Forecast of Wheat Production 2060

We are considering three scenarios for the year 2060. In first scenario we are assuming that both the temperature and precipitation increase and in second scenario we assume that temperature increases and precipitation remains constant whereas, in third scenario we assume that temperature increases but precipitation decreases. We are considering three alternative increases in temperature, namely 2^oC, 4^oC and 5^oC. Moreover, we assume 10 percent increase or decrease in precipitation. Besides temperature and precipitation we assume double level concentration of CO_2 in all the three scenarios. We do not assume any increase in water availability on the basis of water scarcity [IPCC (2007)] and take the current level of water availability.

We use the coefficient values of the variables and constant term value from the VAR model estimation (Table 2). Moreover, the values of our variables for 2059 are generated through extrapolation.

Scenario 1

If both the temperature and precipitation increase:

Case 1: If temperature increases by 2^oC and precipitation increases by 10%	
E (Wheat 2060)	= –7210.404 + 0.186449 (wheat2059) + 0.131691 (CO_2 2059) +265.6333 (Avg. Temp2059) + 16.29369 (Avg. Prep2059) + 95.77185 (Water 2059) + 0.028147 (Area 2059) = –7210.404 + 0.186449 (115778.2) + 0.131691 (98070) + 265.6333 (24.6) + 16.29369 (43.2) + 95.77185 (142.9) + 0.028147 (19307) = 48758.9
Case 2: If temperature increases by 4^oC and precipitation increases by 10%	
E (Wheat 2060)	= –7210.404 + 0.186449 (wheat2059) + 0.131691 (CO_2 2059) +265.6333 (Avg. Temp2059) + 16.29369 (Avg. Prep2059) + 95.77185 (Water 2059) + 0.028147 (Area 2059) = –7210.404 + 0.186449 (115778.2) + 0.131691 (98070) + 265.6333 (26.6) + 16.29369 (43.2) + 95.77185 (142.9) + 0.028147 (19307) = 49290.1
Case 3: If temperature increases by 5^oC and precipitation increases by 10%	
E (Wheat 2060)	= –7210.404 + 0.186449 (wheat2059) + 0.131691 (CO_2 2059) +265.6333 (Avg. Temp2059) + 16.29369 (Avg. Prep2059) + 95.77185 (Water 2059) + 0.028147 (Area 2059) = –7210.404 + 0.186449 (115778.2) + 0.131691 (98070) + 265.6333 (27.6) + 16.29369 (43.2) + 95.77185 (142.9) + 0.028147 (19307) = 49555.7

Scenario 2

If temperature increases but precipitation remains constant:

Case 1: If temperature increases by 2°C and precipitation remains constant	
E (Wheat 2060)	= –7210.404 + 0.186449 (wheat2059) + 0.131691 (CO_2 2059) +265.6333 (Avg. Temp2059) + 16.29369 (Avg. Prep2059) + 95.77185 (Water 2059) + 0.028147 (Area 2059) = –7210.404 + 0.186449 (115778.2) + 0.131691 (98070) + 265.6333 (24.6) + 16.29369 (39.2) + 95.77185 (142.9) + 0.028147 (19307) = 48693.6
Case 2: If temperature increases by 4°C and precipitation remains constant	
E (Wheat 2060)	= –7210.404 + 0.186449 (wheat2059) + 0.131691 (CO_2 2059) +265.6333 (Avg. Temp2059) + 16.29369 (Avg. Prep2059) + 95.77185 (Water 2059) + 0.028147 (Area 2059) = –7210.404 + 0.186449 (115778.2) + 0.131691 (98070) + 265.6333 (26.6) + 16.29369 (39.2) + 95.77185 (142.9) + 0.028147 (19307) = 49224.9
Case 3: If temperature increases by 5°C and precipitation remains constant	
E (Wheat 2060)	= –7210.404 + 0.186449 (wheat2059) + 0.131691 (CO_2 2059) +265.6333 (Avg. Temp2059) + 16.29369 (Avg. Prep2059) + 95.77185 (Water 2059) + 0.028147 (Area 2059) = –7210.404 + 0.186449 (115778.2) + 0.131691 (98070) + 265.6333 (27.6) + 16.29369 (39.2) + 95.77185 (142.9) + 0.028147 (19307) = 49490.5

Scenario 3

If temperature increases and precipitation decreases:

Case 1: If temperature increases by 2°C and precipitation decreases by 10%	
E (Wheat 2060)	= –7210.404 + 0.186449 (wheat2059) + 0.131691 (CO_2 2059) +265.6333 (Avg. Temp2059) + 16.29369 (Avg. Prep2059) + 95.77185 (Water 2059) + 0.028147 (Area 2059) = –7210.404 + 0.186449 (115778.2) + 0.131691 (98070) + 265.6333 (24.6) + 16.29369 (43.2) + 95.77185 (142.9) + 0.028147 (19307) = 48630.1
Case 2: If temperature increases by 4°C and precipitation decreases by 10%	
E (Wheat 2060)	= –7210.404 + 0.186449 (wheat2059) + 0.131691 (CO_2 2059) +265.6333 (Avg. Temp2059) + 16.29369 (Avg. Prep2059) + 95.77185 (Water 2059) + 0.028147 (Area 2059) = –7210.404 + 0.186449 (115778.2) + 0.131691 (98070) + 265.6333 (24.6) + 16.29369 (43.2) + 95.77185 (142.9) + 0.028147 (19307) = 49161.4
Case 3: If temperature increases by 5°C and precipitation decreases by 10%	
E (Wheat 2060)	= –7210.404 + 0.186449 (wheat2059) + 0.131691 (CO_2 2059) +265.6333 (Avg. Temp2059) + 16.29369 (Avg. Prep2059) + 95.77185 (Water 2059) + 0.028147 (Area 2059) = –7210.404 + 0.186449 (115778.2) + 0.131691 (98070) + 265.6333 (24.6) + 16.29369 (43.2) + 95.77185 (142.9) + 0.028147 (19307) = 49427

In all the three scenarios the carbon dioxide, temperature and precipitation are creating positive impact and increase the wheat production at double level as compared to the current level of wheat production. In order to attain this level of production we have to increase land under wheat cultivation. We may conclude from the results of our study for 2060 that the level of production in 2060 would not be much higher as compared to the current level of wheat production. The annual population growth of Pakistan is 1.6 percent at present and according to our results wheat production around 49000 thousand ton after 50 years would not be sufficient to fulfil the wheat requirement of huge population.

5. CONCLUSIONS AND RECOMMENDATIONS

The Vector Autoregression (VAR) model is used in this study in order to check the impact of climate change on wheat production in Pakistan. The study used data of the last half century. The results of historical data estimation reveal that up to now there is no significant negative impact of climate change on wheat production in Pakistan. However, future wheat production will significantly depend on the area under wheat cultivation and the climate change variables. On the basis of variance decomposition analysis the values of the area under wheat cultivation and the climate change variables cause 30 percent and 34 percent variation in wheat production, respectively. Therefore, in terms of climate change the water availability and temperature become focal point for future wheat production.

Wheat is main food crop of Pakistan. The newly emerging threat of climatic change may influence the level of wheat production in Pakistan. Being an agricultural country we should be capable to secure domestic consumption by increasing the level of wheat production and the surplus production can be exported abroad to earn foreign exchange. In order to cope with any type of emerging hazard of climate change the agriculture sector in Pakistan needs some adaptation strategies. In this regard some strategic measures are mentioned below:

(1) Water conservation management and the irrigation system have to be improved.
(2) New heat and drought resistant seeds and plants of wheat have to be produced.
(3) Wheat cultivation methods shall be adjusted according to the changing pattern of climate change.

Appendices

APPENDIX-1
INTERNATIONAL EFFORTS TO ABATE THE GHGs

In order to cope with the global warming, a globally emerging threat, UN formed a body known as United Nation Framework Convention on Climate Change (UNFCCC) in March, 1994. Most of the countries are members of this body. Purpose of this body is to share information regarding emission among signatories' countries [Tisdell (2008)]. It does not impose penalty on the countries, rather it provides a plate form for the member countries to negotiate and to formulate policies. It was the success of this body that Kyoto agreement was first negotiated in 1997 which was ultimately ratified in 2005. The basic motive of this protocol was to bring back the emission of GHGs, namely Carbon Dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydroflorocarbon (HFCs), Perflorocarbons (PFCs) and Super hexafluoride (SF6) at 1990 level. For this purpose the protocol proposed different mechanism to abate the CO_2 emission. These include clean development mechanism, emission trading and joint implementation.

USA, being one of the main polluters, has not ratified the protocol yet. Countries like China and India are also increasingly contributing toward emission of GHgs, however, these countries are not obligated per Kyoto protocol to reduce the emission. In this scenario the perspectives for success of the Kyoto Protocol in abating GHGs are not quite promising.

APPENDIX-2

APPENDIX-2

APPENDIX-2

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The Value of Reduced Risk of Injury and Deaths in Pakistan—Using Actual and Perceived Risk Estimates

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1. INTRODUCTION

Different safety measures adopted by governments across the globe require the estimates of willingness to pay of the people to swap wealth for a reduction in the probability of death and injury. The approximation of these trade-offs are employed in assessing the cost-benefit analysis of environmental issues, public safety measures on highways and roads, medical treatments, and many other areas. Economists term a trade-off between money and fatality risks as the Value of a Statistical Life (VSL).

The Value of Statistical Life and Limb is generally predicted using one of the three main approaches. The first is by the compensating wage differentials that workers must be paid to take riskier jobs [Viscusi and Aldy (2003)]. The second approach examines other behaviours where people weigh costs against risks [Blomquist (2004)] and the third is through contingent valuation surveys where respondents report their willingness to pay (WTP) to obtain a specified reduction in mortality risks. The VSL is then obtained by dividing the WTP by the risk reduction being valued [Alberini (2005)].

However, most of these studies are conducted in developed countries and previously no such estimates based on willingness to pay (WTP) studies were available for Pakistan. A recent World Bank publication[1] had disclosed that the annual health effect of ambient air pollution in Pakistan includes 22,000 premature deaths among adults and 700 deaths among children under five. The total health cost of air pollution is estimated to be between .62 billion PKR to Rs 65 billion PKR or approximately one percent of

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[1]EPA/ World Bank (2006).

GDP. It places the implied VSL figures to be in the range of 58 billion to Rs 61 billion PKR or less than three million per statistical life.

Nevertheless, these estimates are less than many regional and international studies.[2] Besides this, these estimates are based on extrapolated values from other countries, on cost of illness approach, and human capital approaches in the absence of true willingness to pay (WTP) estimates for the country.[3] Economists term such estimates as a lower bound of the premature mortality and morbidity. The absence of true estimates of VSL poses a serious problem for the policy maker in the cost-benefit analysis of different policy options.

We estimate the value of statistical life and injury in Pakistan based on compensating wage differential among the blue-collar male workers of the manufacturing sector in Lahore. We estimate the wage-risk tradeoff based on 2-digit industry level, as well as perceived measure of risk. Perceived risks are more plausible as they reflect job and work specific risks rather than industry aggregates which simply signal same level of risks for all occupations and work in a specific industrial classification. However, workers are not typically used to compute risks, this might overestimate the results.[4] To circumvent this problem we introduce two variants of the perceived fatal risk.

This is the first study of its kind in Pakistan. The results of the study shall help different agencies and research bodies for the evaluation of different safety programmes. The study will also be a springboard for further exploration and research in this area.

2. THEORETICAL IDEAS

Workers while considering the job characteristics examine many pecuniary and non-pecuniary characteristics of work, such as wages, work time career path, ease and hardship of work, pension and benefits and risk of life and health. Nonetheless, as noted by Viscusi (1978a, 1978b) that job safety is expected to be one of the most important characteristics. The theory of compensating wage differentials postulates that if a job is more riskier than the other jobs and this is known to the workers, then there must be some other more valued characteristics of that job as a compensation, but if the non-monetary aspects of all the others job are the same, then the compensation should be in the from the higher wages.

The theory was originally formed by Adam Smith who explicated that "The wages of labourers vary with the ease or hardship, the cleanliness or dirtiness, the honorableness or dishonorableness of the employment." Economists have developed statistical models to realise the difference in workers' productivity and different component of job by unraveling wage-risk trade-off from other factors affecting wages. Griliches (1971), Rosen (1974, 1986), and Thaler and Rosen (1975) have reorganised this concept. The critique has been termed as the Hedonic (quality adjusted) Wage Model which tries to determine the variability in wages pertaining to different factors including job related fatal and non-fatal risks.

While considering the Hedonic Wage Model, the demand for labour is a decreasing function of the cost of employing labourers. These costs include wage,

[2]See Madheswaran for estimates of VSL in India (2004).
[3]EPA/ World Bank (2006).
[4]Hammitt and Ibarraran (2006).

compensation, training and development, rest days, provision of safety measures, etc. Firms are willing to pay less to their workers as the cost of safety for a given level of profit increases. Given the wage risk offers, workers choose a wage-risk combination in the market offering highest wages. The supply of labour is fractionally influenced by their wage, risk preferences, besides numerous pecuniary and non pecuniary job characteristics.

The hedonic wage model can be explained with state-dependent utility functions. Let $U(w)$ represent the utility of a worker in good health earning wage w and let (w) represent the utility of an injured worker at wage w. More routinely workers' are paid compensation for an injury depending upon wage one was receiving. Suppose that the compensation received by the worker and its association with the wage is symbolised by the functional form of $V(w)$, and beside this it is also supposed. beside this it is also supposed that workers favour healthy state over an injured one, that is, $U(w) > V(w)$. Moreover, the marginal utility of income is positive. Symbolically, $U'(w) > 0$ $V`(w) > 0$. Let p be the probability of risky event. Labours select the wage-risk deal from the available alternatives. Then the expected utility of the worker can be expressed as:

$$Z = (1 - p)\, U(w) + pV(w). \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

And the wage-risk swapping can be expressed as:

$$dw/dp = -Zp / Zw = U(w) - V(w)/ (1 - p)\, U'(w) + p\, V`(w) > 0, \quad \ldots \quad \ldots \quad (2)$$

Therefore, wage must increase with the increase in the degree of risk. As a result the wage-risk swap is equated to the differentiation in the utility levels of the two states by the expected marginal utility of income. We need the observed market data to study equality between these two, and for many workers, observations of a range of workers are the combination of workers' wage and risk trade-offs. Hedonic wage models trace these loci of point by workers which is determined by the demand and supply in the market. Precisely, the coefficients match to the employee's marginal willingness to accept risk, on the other hand his demand for more safety and the firm's incremental cost for the provision of increased safety demand plus the decrease in the marginal cost faced by the firm owing to more risk faced by the worker.[5]

Data and Variables

For estimation of the hedonic wage equation, take home hourly wages have been used as a dependent variable. This was obtained directly from the respondents.[6] The independent variables include risk variables such as annual average fatalities per 10,000, nonfatal accident per 100 workers, human capital variables such as age, education, experience, and job characteristics such as type of permanent or temporary jobs, job related trainings compensation provided by the company in case of industrial accident etc. industrial dummy variables to obtain difference in the wage among different

[5]This section is based on the meta analysis of Viscusi and Aldy (2003).

[6]The respondents had reported monthly wages which were annualised and then were divided by 2000 hours to obtain hourly wages. The 2000 hours is a standard annual work time and many studies including Viscusi and Aldy (2003) and Madesh (2004) had used similar wage estimates in their respective studies. The same is more or less true for Pakistan.

industrial classifications, and professional dummy variables to control for differences in the wages among different professions such as supervisor, motor operators, electricians and foreman etc.

The data pertaining to worker's fatal accident for the year 2006-2007 was compiled from the records of the Punjab Employees Social Security Institute (PESSI). The institute does not regularly publish these incidents, so the record had to be compiled manually by looking into the registers which were maintained in their main and sub offices across different parts of Lahore.[7] Ironically, even the Federal Bureau of Statistics and Punjab Bureau of Statistics do not publishes details of industrial fatal accidents.

Table 1

Sampling Frame

Details	No. of Respondents	Max per Factory
31Food Group	125	10
32 Textile Group	83	7
33 Wood and Furniture	125	10
34 Paper and Publishing	83	7
35 Chemical Group	83	7
36 Non Metallic	125	10
37 Metal Group	125	10
38 Fabricated Metal	125	10
39 Other	125	10

The data pertaining to non-fatal accidents per 100 workers was compiled from the data set of the Labour Force Survey (LFS)[8] (2006). Non-fatal risks have also been used as one of the explanatory variable in this study. However, we have employed two different types of non-fatal risks. Both have been obtained from the LFS.[9] This has been done to analyse the difference in the respective Values of Life and limb. The two measures of injuries have been used in separate equations. One of such measures is the Punjab non-fatal industrial accidents among the manufacturing sector workers for the year 2006, whereas the other is the, country wise industrial non-fatal accidents for the same year.

But these fatal and non-fatal risk data are two digit[10] industrial risk averages. However, perceived fatal and non-fatal risks were elicited using Likert scales. Separate scales were used for the risk of death and the risk of injuries. These scale ranged from 1-5, where 1 represent minimal and 5 a maximal risk of receiving fatal and non-fatal accidents.[11]

[7]We are especially thankful to Mr Safdar Raja and his team for helping us with the compilation of fatality data.

[8]I am especially thankful to Mr Masood Ashfaq and Mr Tayab at PIDE, Islamabad for helping me in obtaining the LFS data set.

[9]LFS is annually conducted by the Federal Bureau of Statistics (FBS).

[10]2-digits refers to main industrial classifications, for example 31 represent food, beverages and tobacco industries.

[11]The questions were "please tick the appropriate box below indicating your perception of receiving a job related injury/ fatality in your present job in comparison to any other job you can do.

However, following the work of Hammitt and Ibarraran (2006) and others, beside these two measures of perceived risks, another measure was also developed for obtaining the perceived fatal risk. A scale which ranged from 0-10 out of 10,000 was used.[12] As an example, 0/10,000 chances means no chance of risk and 10/10,000 refers to .001 chances of receiving job related fatal accidents. Verbal analogies were used in order to help the respondent answer the question.

We tried two analogies including an explanation such as numbers of hours in fourteen month which are approximately 10,000 and secondly a scenario describing the chances of receiving job related fatal injuries out of 10,000 of people doing the same job as you are doing. We only used second analogy when we realised that the first one is not helping them answer the question and the majority of them could only understand it with the second analogy.

Sampling and Primary Data Collection

Multi stage sampling technique was used for data collection. At the outset, Lahore was selected as the study area because it is the second largest industrial city and is also a nearest study destination. For the interview, the blue collar male workers of the manufacturing sector who had also served in Lahore for at least a year were selected.[13] The survey was also limited to the workers of the factories registered under industrial act 1934. By this means the survey was confined to the formal sector. It was also important to confine the survey to the formal sector because of the fact that the formal sector's labour market is not distorted and the wages were determined by demand and supply.[14] Further stratified random sampling technique was adopted to draw out the representative sample. The stratification was done based on the National Industrial Codes (NIC) which has classified the industrial group in to nine industrial categories.

For determining the sample size precedent was used as many other regional and international studies have employed a sample size of more than a 1000 workers[15], hence it was taken as a precedent and the sample size was set down as 1000 blue collar male workers. Interestingly, the sample size also turned out to be ten percent of the manufacturing workers in Lahore.

The factories and respondents were randomly picked up; as an example any seven to ten workers were interviewed from the concerned industrial classification. However the number of industrial unit per industrial classification and the number of respondents per factory was based on the risk categories. The reason for including more workers and factories from high risk categories was to allow the variation in the data. The risk categories were obtained from the Labour Force Survey for the year 2006.[16]

[12]The spearman's correlation between the two perceived risk measures is found to be .51 and is statistically significant result. The relationship is not too high, but the relationship is positive and significant. This shows the consistency of the workers response.

[13]This was done to ensure that interviewee knew the labour market situation and were aware of the job related risk.

[14]There was no sample selection bias because the informal markets are not fully functioning and the market is really distorted. Moreover, in the formal sector though there are minimum wage laws however, those are hard to implement and the role of unions is minimal.

[15]See Madesh (2004) and Viscusi and Aldy (2003).

[16]See annexure-3 for further details.

A survey was designed to collect data from the workers of the manufacturing sector. In person interviews were conducted from the blue-collar male workers. The questionnaire was pretested in a pilot study of fifty workers. The results of the pilot study were used to strategise the data collection procedure. During the said study it was observed that the industrialists were hesitant to allow their workers to be interviewed. Beside this, it was also observed on few occasions that the workers were instructed not to answer few questions. Therefore, for the final survey a three prong approach was adopted for interviewing the respondents, Firstly, by contacting the employers, secondly, by visiting the cafeterias inside industrial zones during lunch or tea time, and a third, by going to the residential compounds/villages on off days.

The survey started in April 2009, and was extended to all the parts of Lahore including industrial zones, housing colonies and the villages on the peripheries. The main industrial zones are situated on Ferozpur road, Multan roads, Quaid-i-Azam industrial estate, Sundas industrial estate, industries situated on Rai Wind road. Moreover, approximately, fifty five villages on the fringes of Lahore were also expedited for interviewing the workers.

But, due to deteriorating law and order situation the survey was discontinued in October, 2009. Because of this reason, six hundred and eighty respondents were interviewed which is still more than the required number, as per the sampling formula. Table 2 shows the actual number of respondent as against the target in each industrial group.

Table 2

Sample Target Versus the Actual Numbers of Respondents

NIC	Type of Manufacturing	Target	Per Factory	Actual Numbers
31	Manu. of food, beverages and tobacco	125	10 max	121
32	Manuf. of Textile, wool and hosiery etc.	83	7 max	82
33	Manuf. of wood or wood product or furniture	125 respondents	10 max	31
34	Manuf. of paper, paper prod. Printing publishing	83 respondents	7 max	74
35	Manuf. of Chemical petroleum, coal rubber and plastic prod.	83 respondents	7 max	93
36	manuf. Non-metallic product except petroleum and coal	125 respondents	10 max	41
37	Basic metal industries	125 respondents	Do	91
38	Manuf. Fabricated metal product machinery and equipment	125 respondents	Do	116
39	Other manuf. Industries and handicraft	125 respondents	Do	30
	Total Respondents	1000		680

Econometric Model

The data is analysed through the estimation of hedonic wage equations by regressing log of hourly wages on human capital variables, industrial dummy variables and occupational dummies. The hedonic wage equation is given as follows:

$$LnW_i = \beta + H_i \beta_1 + X_i\beta_2 + p_i \beta_3 + q_i \beta_4 + \varepsilon_i \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

Where, *LnWi* is the worker *i's* hourly wage rate in logarithmic term, α is a constant term, *H* is a vector of personal characteristic variables for the worker *i.* This include education measured

as years of education, age and experience, *X* is a vector of job characteristic which comprises, training and compensation variables, six industries dummy, three profession dummy variables, a variable to denote whether the job is permanent or temporary. *Di* is the fatality risk associated with worker *i's* job per 10,000 workers, and *Ni* is the nonfatal injury risk associated with worker *i's* job per 100 workers, and ε_i is the random error.

The dependent variable has been measured as hourly wage rates; evidently many other studies have also used hourly wage rates. However, the choice of the functional form is an unanswered question. Different researchers have used either linear or log-linear form. Subsequent upon the Meta analysis of Viscusi and Aldy (2003), present study has made use of Box-Cox transformation to decide about the dependent variable. We estimated both the linear form and the log form of wages in the resilient Box-Cox transformation, yet it reinforced both the functional form when a log form was used and it supported none when linear form was employed.[17]

Value of Statistical Life and Value of Statistical Injury were computed using the following equations:

$$VSL = \beta`3 * \bar{W} * 2000 * 10000$$

&

$$VSI = \beta`4 * \bar{W} * 2000 * 100 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

Where,

β`s are the respective risk coefficients, $\bar{W}$ is the mean hourly wage rate which is multiplied with the 2000[18] annual hours of work to annualise the Value and is multiplied with the scale of the variable which is per 10,000 workers for the fatality risk variables and per 100 worker for the non-fatal risk variable.

RESULTS AND DISCUSSION

The descriptive statistics along with the definition of the variables which have been used for the present analysis are in Table 3. The average hourly wage rate in log form is 3.705 (anti-log= 42PKR[19]). Average education is six years of schooling and average age is 27 years. Average experience in the present occupation is 5 years.

The 2-digit industry level fatality rate and the perceived fatality rate are almost similar with a slight variation that is 1.17 and 1.36 per 10,000 per annum. The professed fatality and non-fatality statistics measured on Likert scale reflect mean risks as perceived by workers is below average level of risk (mean risk= 3). The industry level injury averages for both Pakistan as a whole and Punjab-wise are modestly close that is, 4.14 and 3.9 per 100 workers per year respectively.

[17]Evidently, many other researchers, for example Moore and Viscusi (1988a), and Madeshwaran (2004) have employed the same technique. Gunatilake (2003) have also suggested making use of Box-Cox technique for selecting the functional form for such studies. The theta values = 0 was accepted when we used hrwge as dependent, however, when I used lhrwge the hypotheses that theta =1 was accepted. It would be good to present the estimated parameters for Box-Cox transformation. That will make things easier to understand.

[18]This has been done to follow a standard practice. However, there is no change in the results if we use the log of monthly wages.

[19]This was calculated at the prevailing exchange rate which was 1 US$=85PKR.

The estimation results of the alternative hedonic wage models are presented in Table 4. Column 1 and 2 of the Table show the regression results based on 2- digit industry level fatal and non-fatal risk variables, whereas, column 3 and 4 are explicating the regression estimates using the perceived risk measures.

Table 3

Variable Definitions and Descriptive Statistics

Variable	Variable Definition	Mean	Std. Dev.
PRMNT	1 if the worker's job is permanent, 0 otherwise	0.35	0.48
LHRWG	hourly wage in PKR (in logarithm)	3.705	0.304
EDUCN	years of schooling	6.037	4.129
AAAGE	age of the respondent	27.38	7.983
FAMLZ	family size	6.544	2.791
DEPEN	No of dependents	4.46	2.275
SPEDY	1 if the worker job requires speedy work, 0 otherwise	0.73	0.44
EMPFM	Employed family members	2.11	1.201
RGRHR	Regular hours of work	8.697	1.612
EXPER	experience in years	4.842	5.893
DSTNC	Distance from the work place in minutes	31.36	20.78
UNION	1 if union member, 0 otherwise	0.0265	0.16
DCNMK	1 if the worker has to make decision, 0 otherwise	0.43	0.50
TRNNG	1 if the worker is provided any kind of training, 0 otherwise	0.84	0.36
PESFAT	2-digit fatality rate compiled from the office of Punjab Employees Social Security Institute per 10,000 workers	1.17	1.27
LFSPK	2-digit injury rate of Pakistan's manufacturing worker computed from the labour force survey (LFS,2006) per 100 workers	4.14	2.3
LFSPN	Injury rate of Punjab based manufacturing worker computed from the labour force survey (LFS,2006)per 100 workers	3.9	1.88
PRFNJ	Professed/perceived injuries proportion measured on a likert scale 1-5 scale	2.26	1.14
PRFT1	Professed/perceived fatalities proportions measured on a likert scale 1-5	1.27	0.68
PRFT2	Professed/perceived fatalities rate 0-10 per 10000	1.36	2.138
TOTMP	Total no of employees	501	1108
LFINS	1 if the worker life is insured, 0 otherwise	0.08	0.29
COMPS	1 if the worker is provided compensation by the employers , 0 otherwise	0.52	0.51
WTHDM	Wealth dummy= value of the house in PKR	885126	1159938
NMSTK	1 if the worker job requires no mistake, 0 otherwise	0.15	0.37
JBNOS	1 if the worker job is very noisy, 0 otherwise	0.8	0.4
EXPOS	1 if the worker is exposed to smoke or dust, 0 otherwise	0.63	0.48
TXTDM	1 if the worker is from the Textile group, 0 otherwise	0.12	0.32
BSCMT	1 if the worker is from Basic metal group, 0 otherwise	0.13	0.34
SPORT	1 if the worker is from Sport and others group, 0 otherwise	0.04	0.2
WOOD	1 if the worker is from wood and furniture group, 0 otherwise	0.04	0.2
FOOD	1 if the worker is from the food group, 0 otherwise	0.17	0.38
PAPER	1 if the worker is from the paper group, 0 otherwise	0.10	0.31
CHEME	1 if the worker is from the chemical group, 0 otherwise	0.13	0.34
FABRI	1 if the worker is from the fabricated metal group, 0 otherwise	0.17	0.37
DSTRT	1 if the worker is from district Lahore, 0 otherwise	0.71	0.45
SUPER	1 if the worker is a supervisor, 0 otherwise	0.036	0.18
MACOP	1 if the worker is a machine operator, 0 otherwise	0.23	0.42
FORMN	1 if the worker is a foreman, 0 otherwise	0.04	0.2

Table 4

Regression Results of the Alternative Hedonic Wage Equations

Variables	(1)	(2)	(3)	(4)	*(5)*
PRMNT	–	0.063***	–	–	–
		(0.02)			
EDUCN	0.013***	0.011***	0.015***	0.013***	0.01***
	(0.003)	(0.003)	(0.003)	(0.0028)	
AAAGE	0.009***	0.007***	0.008***	0.008***	0.03***
	(0.002)	(0.001)	(0.002)	(0.0018)	
EXPER	0.003	0.003	0.002	0.003	0.004
	(0.003)	(0.002)	(0.002)	(0.0026)	
TRNNG	0.02	–	–	–	–
	(0.03)				
PESFAT	0.361***	0.141***	–	–	0.36**
	(0.105)	(0.03)			
LFSPK	0.19***	–	–	–	–
	(0.068)				
LFSPN	–	0.054***	–	–	–
		(0.02)			
PRFNJ	–	–	0.06	0.049	–
			(0.08)	(0.0901)	
PRFT1	–	–	0.156***	–	–
			(0.06)		
PRFT2	–	–	–	0.542**	–
				0.2408	
COMPS	–	0.08***	–	–	–
		(0.02)			
TXTDM	0.949***	0.449***	0.119***	0.169***	–
	(0.295)	(0.095)	(0.044)	0.0504	
BSCMT	–0.39***	–	0.165***	0.22	–1.1*
	(0.13)		(0.042)	0.0558	
SPORT	–	–	–	0.219	–1.04*
				0.056	
WOOD	–	0.062	–	–	–0.006
		(0.064)			
FOOD	–	0.112***	–	–	–0.15***
		(0.04)			
PAPER	0.11	–	0.016	0.072	–0.9**
	(0.11)		(0.041)	0.054	
CHEME	1.069***	0.338***	–0.02	0.052	0.02
	(0.37)	(0.105)	(0.03)	0.0449	
FABRI	–0.185***	0.07*	–	0.094**	–0.2***
	(0.067)	(0.04)		0.0481	
NONMETL	–	–	–	–	–0.03
SUPER	0.401***	0.356***	0.366***	0.369***	0.35***
	(0.098)	(0.07)	(0.104)	0.0981	
MACOP	–	–	–	–	–0.01
FORMN	0.41***	0.385***	0.443***	0.427***	0.4***
	(0.084)	(0.06)	(0.08)	0.0834	
EXPERSQ	–	–	–	–	–0.00004
R^2	0.25	0.25	0.21	0.22	0.24
F	11.5	15.84	12.44	11.15	
VSL (PKR)	26,640,000	10,374,000	11,554,000	37,000,000	
VSL@85PKR/$	$313,411	$122,047	$135,811	$435,294	
VSI@85PKR/$	$1654	$470	$523	$427	

Note: The parentheses are showing robust standard errors of the estimates except for the second model. This is due to the fact that hetroscedsticity test for the second model was insignificant.

The coefficient of fatal risk in all the five models using either industry level actual risk data, or individual level perceived risk measure, is positive and statistically significant. This clearly authenticates the compensating wage differentials theory and establishes that labour markets in Pakistan do pay wage premium for higher risk. However, non-fatal risk coefficient is significant when actual risk data is used.

The coefficients of fatal and non-fatal variables and subsequently the VSL and VSI in column one, is substantially higher as compared to the estimates in column two. Both the models include the same fatal risk variables, however, the former incorporates the country level non-fatal risks statistics, whereas the latter has used province wise risk data. But in our opinion the results of both the models are not directly comparable owing to different model specification. Nonetheless, this does points out the variation in VSL and VSI to the use of different risk measures and right hand side variable. The choice of the right hand side variables is based on the Likelihood Ratio (LR) test.

Similar variations are observed when the two variant of the perceived fatal risk variable along with the same non-fatal risk data are used. The VSL in column 4 which is based on the workers' perception measured on a scale 0-10/10,000 is considerably high not only as compared to the VSL estimates from alternative perceived fatal risk estimate in column 3, but is also higher than any other model. However, the model is also differently specified. The choice of the covariates in the entire estimated regression models is based on the LR test.

However, to check the robustness of our results, we have also estimated a model which includes all the industrial dummies except one. Column 5 is showing the results of such a regression. The regression model includes objective measure of fatal risk variable, but it does not include the injury variable. The coefficient of the risk variable is the same as in column 1.

The coefficients of the human capital variables are not sensitive to the choice of the other explanatory variables in the model. Both the age and education are showing positive and significant relationship with the hourly wage in all the estimated regression models, however, the result of the work experience is insignificant in all the estimated regression models. The results of the professional dummy variables are also robust and are showing little sign of variations. The outcome of these two variables shows that supervisors and foreman on the average earn 36 percent and 41 percent more than all other professional categories.

One of the industrial dummy variables, that is textile, has shown consistent results and it shows evidence of higher earnings of this group as compared to the base category. The results of other industrial classification are mixed and the coefficients are also changing signs in different specifications. This may be due to the multicollinerity problem, however, the results of the partial correlation do not show any sign of it.

Evidently, within one of the specified model, the coefficient results elucidate that workers of permanent status earns more on the average, whereas, workers who had received compensation for job related non-fatal accidents in the past receive low wage. Both the coefficients are statistically significant.

We have confirmed the structural stability of our regression models by restricting the estimations to 384[20] respondents as was set by the sampling formula. The results are

[20]These 384 observations were randomly generated in SPSS.

quiet robust and there has been no considerable changes in the results of the estimated coefficient.

The Value of Statistical Life and Value of Statistical Injury are shown in the Table 4. VSL based on actual risks is between $ 122,047 and $313,411. Whereas, VSL based on perceived risks is between $122,811 and $435,294. The VSL based on actual risk in column 2 and that in column 3 based on perceived risks are akin. The Value of Statistical Injury based on actual risks is within a range of $417 and $1654.

These values are smaller as compared to the VSL of many developed countries which is in the range of $4 million and $9 million, however our results are comparable with the estimates of many developing countries, including Mexico, India, South Korea, and Hong Kong.[21] Table 5 shows the comparison of the VSL and VSI for the developing countries.

Table 5

Comparative Statistics of VSL and VSI of Developing Countries[22]

Study	Country	Average Income (2000 US $)	Average Fatal Risk (per10000)	VSL (2000 US $)	VSI (2000 US $)
Hammitt and Ibarraran	Mexico	4100	3.0	230000-310000	3000-10,000
Kim and Fishback	South Korea	8100	4.9	800,000	
Liu, *et al.*	Taiwan	5000-6100	2.3-3.8	200,000-900,000	
Liu, *et al.*	Taiwan	18500	5.1	700,000	50,000
Shanmugun	India	780	1.0	1,200,000-1,500,000	
Shanmugun	India	780	1.0	1,000,000-1,400,000	150,000-560,000
Shanmugun	India	780	1.0	4,100,000	350,000
Madesh	India	780	1.13	305,000-318,000	
Siebert and Wei	Hong Kong	11700	1.4	1,700,000	

Calculating VSL for Pakistan Based on Prediction Equation

In order to reinforce the validity of our estimates, we have also computed the Value of Statistical Life for Pakistan based on the Bowland and Beghin (2001) prediction equation which can be used to estimate the VSL for the developing countries. The equation is based on the Meta Analysis of the industrialised countries and it takes in to account the difference in risk, human capital and income between the developed and developing countries. The income elasticity estimated by the ranges from 1.52 to 2.269.[23] However, we have used the income elasticties estimated by different studies to compute Value of Life for Pakistan. Table 6[24] present the VSL based on the prediction equation. The equation provides us a range of VSL from $0.17 million to $1.2 million, nevertheless, Miller's estimated range of elasticities gives a close approximation of our reported results.

[21]See Viscusi and Aldy (2003).

[22]The table has been partly developed from the study of Hammitt and Ibarraran (2006).

[23]See Brajer and Rehmatian study "From Diye to Value of Statistical Life: A Case Study of Islamic Republic of Iran".

[24]For developing this table we have taken help from e Meta Analysis of Viscusi and Aldy (2003), USEPA and World Development Indicators(WDI).

Table 6

VSL for Pakistan Based on Prediction Equation Using Different Income Elasticities

Study	Income Elasticity (α)	US GNI per Capita (2008)	Pakistan per Capita (2008)	US VSL	VSLpk= VSLus $(GNIpk/GNIus)^{\alpha}$
Miller (2000)	0.85	$47930	$950	$7,400,000	$264107
Miller (2000)	0.96	$47930	$950	$7,400,000	$171578
Morzek and Taylor (2006)	0.46	$47930	$950	$7,400,000	$1218723
Morzek and Taylor (2006)	0.49	$47930	$950	$7,400,000	$1083474
Viscusi and Aldy (2006)	0.52	$47930	$950	$7,400,000	$963234
Viscusi and Aldy (2003)	0.61	$47930	$950	$7,400,000	$676819

CONCLUSION

This is the first study of its kind in Pakistan. Previously there have been no estimates available for the country based on either compensated wage models or contingent valuation method. Subsequent upon the results of the estimations, the study concludes that the Compensating-wage differential does exists in the formal private sector in Pakistan and the market does compensate the workers for taking risk. Moreover, since these compensating differentials are the consequence of labour demand and supply, therefore the hypothesis that the workers are rational and they do consider risk while accepting jobs, is therefore fully validated. The study has estimated the Value of Statistical Life (VSL) to be between $ 122,047 and $435,294 per statistical life. Moreover, the Value of Statistical Injury (VSI) is within a range of $417 and $1654 per statistical injury. The variations in the results are due to the use of different risk measures, that is, actual and professed or perceived risk measures in alternative regression equations. The regression models are fully robust and do not suffer from any econometric problem. The usual econometric problems, such as Hetroscedsticity, and specifications biases have been fully taken care off. In addition to this it is also concluded that the models are structurally stable model and the results based on a sample size of 384 respondents and that of 680 respondents do not vary dramatically. These values are robust and can be used for the cost-benefit analysis (CBA) of the safety projects in Pakistan pertaining to abatement of pollution, medical intercession and highway safety measure etc. It can be also be used for settling claims on insurance companies and other court settlement cases etc. Moreover, in the context of ongoing war on terrorism, policy maker can use it for evaluating the impact assessment of different policy options. The results of the study provide a breeding ground for supplementary exploration and research in this area.

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The Unchanging Profile of Development: A Historical Study of the Punjab 1961–2008

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In recent years, the importance of historic events in the socioeconomic development of countries has emerged as an important area of research. There is a growing interest in determining the impact of historic events and conditions such as colonial rules, institutions, and factor endowments on the economic and social circumstances of countries today. Furthermore, the levels of development in the early decades of newly independent territories can have long term effects on the progress of those regions [Nunn (2007, 2009); Olsson and Hibbs (2005); Acemoglu, Johnson, and Robinson (2001); Engerman and Sokoloff (2000); La Porta, *et al.* (1998)].

For Pakistan, studies on development mainly focus on the prevailing social and economic conditions of the state with no focus on past performances and initial conditions. Such analyses can only provide an overview of the present situation, but they cannot provide sufficient insights about changes in the development patterns over time. A longitudinal analysis can assist in understanding several aspects of development such as whether the social welfare status of a region has improved, worsened or remained stagnant over time, how have the regions within Pakistan performed relative to each other and what are the causes for their differential performances, how important are initial conditions and can these initial human and social capital endowments be the driving forces for development? Moreover, such an analysis can also assist in verifying if the urban centers have had positive spillovers on the peripheral regions.

This paper aims to examine the spatial patterns of development in Punjab over the past five decades. The intention is to study the importance of initial conditions in the development process, and explore the contributing factors which may provide the necessary push to break away from the low development trap. Furthermore, in the course of the paper, the questions raised in the last paragraph will be addressed as part of the analysis on the districts of Punjab. A development index will be created which will serve as a proxy for the level of development and assist in gauging development levels over space and time. The first section of the paper deals with the creation of an index and the selected methodology, in the second section, the index is applied to attain development

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rankings of the districts followed by an in-depth analysis of the regions. The last section will highlight the main conclusions of the study and very briefly suggest the possible future trajectory of provincial policies to overcome underdevelopment at the district level.

For a very long time, development was regarded as a unidimensional concept which could be measured by personal income or per capita product [Muro, *et al.* (2009)]. It was assumed that economic growth would automatically trickle down to the masses and if the benefits could not be passed on to the poor, then the government would intervene and play its redistributive role [Hicks and Streeten (1979)]. However, over time, several countries like Pakistan were forced to accept that growth did not translate into prosperity for the masses, in fact, it came at the cost of rising income inequality and deteriorating social indicators. William Easterly (2001) considered Pakistan's social backwardness as startling—a paradox of decent economic growth rates and abysmal human indicators.

A new direction in economics emphasises on the need to achieve development as a goal in itself and not as a byproduct of the growth process. If meeting basic human needs and expanding people's choices and capabilities is the goal, then the appropriate measure of human welfare should be based on the quality of life of people and not their income levels. The human development index (HDI), developed by the UNDP, takes into account wellbeing, knowledge and standard of living. Even though the HDI is the most widely applied index for measuring welfare, it has been criticised for its narrow selection of variables, application of equal weights to all components and simplistic methodology [Stanton (2007)]. In response to these criticisms, researchers have developed more dynamic multidimensional instruments of measurement. The purpose is to effectively capture the true status of development across regions and so more variables from different sectors are included in the measurement process. The development index created in this paper is based on the more recent literature on human development on Pakistan. The state of development at the earliest point of analysis, that is 1961, will be considered to be indicative of the initial conditions prevailing in Punjab. The political economy of Pakistan will be discussed from time to time to serve as a backdrop for the ongoing discussion of human development and social wellbeing of the people.

1.1. Data Sources and Choice of Indicators

To construct a development index over time, the availability of a consistent time series data source becomes a crucial requirement. Moreover, to capture the conditions prevailing at a time back in history becomes even trickier. In the early years of Pakistan's independence, very few datasets and reports were compiled regularly. The Pakistan Census Reports and the Punjab Development Statistics are some of the earliest reports produced which are representative at the district and tehsil levels. The first nationwide population census was conducted in 1951 and from then onwards it was carried out every decade. This paper will use the district census reports of Punjab for the years of 1961, 1981 and 1998.[1] The 1998 census is the last national census that has been conducted by the Population Census Organisation. To extend the analysis to the next decade, this paper

[1]The 1971 district census reports comprise of a very limited selection of variables (mostly population statistics), and therefore cannot be used for the construction of the development index.

will use the Multiple Indicator Cluster Survey (MICS 2007-08) for Punjab conducted by the Punjab Bureau of Statistics. The first MICS survey was conducted nationwide in the year 2003-04 in collaboration with UNICEF. MICS (2007-08) is a cross-sectional micro-level dataset which consists of 91,075 households and 592,843 listed members, moreover it has information for about 70 indicators at the Tehsil level.

To fully capture the level of development across Punjab variables from a wide spectrum of sectors must be selected. When deciding the selection of indicators, this paper will mostly follow the literature and the considerations it takes into account. [Jamal and Khan (2003); Jamal (2001); Ghaus, *et al*. (1996)]. There are two approaches to determine development; one is to focus on the consequences of development in a region, known as the output approach. For example, to measure the progress of the health sector's initiative against the polio disease, the number of children affected each year by polio can be used as an indicator of the effectiveness of the health policy. The other approach is to study the inputs that go into development such as the number of polio vaccinations done each year by the health department [Ghaus, *et al*. (1996); Hicks and Streeten (1979)]. A combination of both approaches is not uncommon in the literature as certain variables regardless of which approach they belong to are considered important in assessing development. This paper will mostly rely on the input approach due to the dearth of historic data on variables measuring the outcomes of development policies, however, output variables such as literacy rates will also be included in the analysis. Following the approach adopted by Ghaus, *et al.* (1996) the following sectors will be considered: education, health and housing characteristics. A total of sixteen variables have been selected for the creation of the index.

Education

About half of the variables employed in the development index stem from the area of education. Enrolment rates reflect the perception of people towards education, as well as the access to it. Gross enrolment rates at the primary, secondary and tertiary level are included to determine the prevalence of education in each time period. Gender wise gross enrolment rates are determined by taking the number of students enrolled in different levels (regardless of their age) and expressing them as a percentage of the corresponding eligible age group population for each level of education.[2] Literacy rates measure cumulative effectiveness of the education policy in the previous years and therefore should be included as a measure of human development. The literacy rate used is for males and females aged 10 years and above.

Health

To determine the accessibility and therefore utilisation of health facilities for this study, the selection of variables is primarily determined by their availability in the early data sources. Three variables have been implemented in the index: hospitals per 10,000 population, beds per 10,000 population and patients treated as a percentage of total population.[3] Information on patients treated and total hospitals and dispensaries in a

[2]Age bracket for each level of education: Primary (5 to 9 years), Secondary (10–14 years), Tertiary (15–24 years).

[3]Patients treated is an output measure and reflects the utilisation of health facilities. It has been widely used in the literature, which is why it is being included in this paper.

district for the years of 1981 and 1998 has been taken from Punjab Development Statistics (PDS) 1981 and 2000, as it was not available in the population censes. However, for the year 1961, information on hospital beds could not be obtained, therefore this variable has not been included in the index for this year.

Housing

Adequate shelter is a key determinant of the quality of life. To measure the conditions at the household level, five variables have been selected. The first measure is the percentage (%) of population with inside water connections. Having access to water is not just a basic human necessity but can also serve as a proxy for the provision of public services. Unfortunately, this variable is missing in the 1961 census. Average household (HH) size and the number of rooms per housing unit reflect the level of congestion in a household. Large households often tend to be strained on resources and are therefore considered to be poorer. The number of rooms in a house estimates if there is sufficient accommodation available for the residents. Percentage of houses with brick walls[4] (*pakka walls*) and the percentage of houses with strong roofs[5] (*pakka roofs*) are included to capture the housing conditions and financial welfare of people living in that household.

2. METHODOLOGY

Different techniques have been adopted in the literature to study development. Some commonly used techniques are the Z-sum technique, the taxonomic distance technique and the factor analysis technique.

The Z-sum technique converts raw data into standardised scores with a zero mean distribution. The technique creates a Z-score by summing the scores of all the indicators for each district and these scores provide a source point for comparison, higher scores imply greater development of a region.[6] A major shortcoming of this technique is that it gives equal weights to all the indicators [Wasti and Siddiqui (2008); Ghaus, *et al.* (1996)]. In the real world, all social factors do not hold the same importance to people and an index that arbitrarily adopts equal weights cannot accurately gauge the level of human development.

The Taxonomic distance measures (TD) the Euclidean distance between the highest standardised value of an indicator in a particular district with the standardised values of all the other districts for that indicator.[7] A lower taxonomic distance for a region implies a higher level of development. This technique has two drawbacks, firstly, like the Z-sum technique, the taxonomic distance also assigns equal weights to all the variables. Secondly, this technique is sensitive to outliers and can therefore represent a skewed order of rankings [Wasti and Siddiqui (2008); Ghaus, *et al.* (1996)].

[4]Walls made out of bricks/blocks/stones and are cement bonded.

[5]Reinforced Concrete and Cement (R.C.C), Reinforced Brick and Cement (R.B.C), girder/beam and baked bricks.

[6]The (Z-sum)j = $\sum_{i=1}^{n} Zij$.

where Zij = (Xij-Xi)/Si, n = number of indicators, Xi = mean value of *i*th indicator, Si= standard deviation of the *i*th indicator, Xij=value of the *i*th indicator in the *j*th district.

[7](TD)j = $[\sum_{i=1}^{n} Zij - Z^*_i)^2]^{1/2}$ where Z^*_i is the highest standardised value of the *i*th indicator in all the regions. Zij is described in footnote 6.

Factor Analysis (FA) is a technique that is well-established and frequently applied in studies examining multidimensional phenomena such as development, poverty, deprivation, etc. [Jamal (2009); Wasti and Siddiqui (2008); Jamal and Khan (2003); Ghaus, *et al.* (1996), Aldeman and Dalton (1971)]. This technique transforms all the correlated variables into a smaller number of uncorrelated factors called principal components. These components are a linear combination of the variables. The FA technique consolidates the data such that it is structured around the covariance structures of the variables.

$$X_i = a_{i1}F_1 + a_{i12}F_{12} + a_{i13}F_3 \ldots\ldots\ldots + a_{ij}F_j \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

X_i represents the indicator or attribute

a_{ij} represents the factor loading and represents the proportion of the variation in Xi which is accounted for the by the *j*th factor

$\sum a_{ij}$ is equivalent to the multiple regression coefficient in regression analysis (communality)

F_j represents the *j*th factor or component

[Ghaus, *et al.* (1996)]

The factors or clusters generated by the principal component analysis are represented with descending order of importance. The first component explains the greatest the amount of variation in the data and the last component explains the least variation. Usually, the first few components are sufficient for determining majority of the variation in the data.[8] Once the factors have been determined, every district is ascribed a score on the principal component by applying the factor loading as a weight, and multiplying the score with the standardised values of the variables [Jamal (2009)].

$$(FS)_i = \sum_n e_{ij} * Z_j \,] \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

$(FS)_i$ is the factor score of the *k*th district and the *j*th factor

e_{ij} is the factor loading of *j*th factor and *i*th indicator

Z_j is the standardised value of the *i*th indicator

Furthermore, weighted factor scores (WFS) are computed from the FA technique in the following manner:

$$(WFS)i = \sum_k e_j * (FS)kj \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

Where e_j is the eigenvalue of the factor *j* and captures the proportion of variation (weight) in the data which is being explained by the factor *j*. A higher WFS represents greater development, therefore these scores can be used as an index for ranking the districts according to their development levels [Ghaus, *et al*. (1996)].

The development index (DI) created in this paper will be based on the FA technique due to its sophistication and application in the literature. This does not imply that FA is the most effective technique for such an analysis, however, it serves the purpose for this study. To establish the robustness of the results obtained from FA, the development rankings of the districts from FA are compared to the rankings obtained from the Z-sum and TD techniques. The following correlations are obtained:

[8]Varimax rotation has been applied in the factor analysis.

Table A

Correlation Matrix for DI Rankings

	Factor Analysis Scores			
	1961	1981	1998	2008
Z-Sum	0.97	0.99	0.99	0.99
TD	0.98	0.95	1.00	0.98

The high correlations between the results demonstrate the robustness of the FA technique. The factor loadings showing the load of each indicator for different factors are given in Appendix Table 1. The eigenvalues determine the amount of variation in the total sample explained by each factor. The communality measures the percentage of variance in a variable explained by all the factors collectively. Variables loaded in the first factor are the most important as they capture the greatest source of disparity in development across districts.

2.1. Development Profile of Punjab

To conduct an extensive analysis of Punjab, the province will be divided into four regions, namely North, Center, West and South, according to the boundaries adopted by Cheema, *et al.* (2008). In the study, the authors give historic, socioeconomic, cultural and linguistic grounds for the distribution of districts into separate regions. In the colonial era, the northern and central regions of Punjab had better human capital endowments and therefore these regions were able to benefit from the colonisation process. Due to high literacy levels in the north, this region has gained from greater access to government employments, army recruitments and remittances from migrant labour. The centre has emerged as the most industrialised region in the province and has seen the greatest rise in income levels over the past decades [Cheema, *et al.* (2008)]. The western and southern regions are characterised by higher levels of poverty and income inequality. The strong feudal set-up in the south and tribal structures in the western districts have continued to downplay the process of modernisation in these regions, which is why these districts stand out as socially and economically detached regions of Punjab. [Cheema, *et al.* (2008)]. A graphical depiction of the districts according to regions is given in Figure 1 in the Appendix.

In the 1990s, the number of districts in Punjab increased from 19 (in the sixties) to 35. To study the changing patterns of development over time, the original district boundaries must be maintained. Therefore, the new districts created after 1961 have been merged back to their previous districts. The rest of the discussion is structured such that the span of forty-eight years is divided into three periods: 1961 to 1981, 1981 to 1998 and 1998 to 2008. Each period will be discussed separately in the backdrop of the ongoing political, economic and social conditions.

2.2. The Early Decades: 1961–1981

This period is marked by the changing political regimes, the fall of Bengal and mixed economic policies. The focus of this paper is on the socioeconomic impact of this period and therefore, it will only briefly touch upon the main events that take place in the

two decades. The military rule of General Ayub Khan (1958–68) was a period of high GDP growth rates, political stability, rapid growth in private investment and the green revolution. The green revolution resulted in expanding food and grain productions and self-sufficiency of food in West Pakistan [Bhatia (1990)]. The focus of the government narrowed on the availability of food but ignored the basic needs of education and health [Zaidi (2009)]. Zulfiqar Ali Bhutto reigned over most of the seventies and brought about a socialist regime in Pakistan, after East Pakistan claimed self-determination. This was an era of slow annual growth rates, rising budget deficits, increasing inflation, extensive nationalisation and growing migration of skilled workers abroad [Zaidi (2009)]. Social sectors reforms were introduced and all educational institutions were nationalised. The purpose was to increase access to and reduce the cost of education, however, little attention was directed towards the quality of education [Zaidi (2009)]. Although, limited funds were allocated to education, enrolments at the tertiary level did improve [Kardar (1987)]. Expansion of health facilities was undertaken in the socialist era and the number of basic health units increased countrywide. However, poor funding subverted the health projects, and with the population growth rate at 3 percent per annum the state struggled to effectively provide the masses with basic health and education facilities [Noman (1988)].

From Appendix Figure 2, the graphical patterns of district rankings for each decade can be observed. An important assumption made in this paper is that the stock of human and social capital in the year 1961 indicates the initial conditions of the regions and to an extent reflects how endowed the regions are in terms of development.[9] In 1961, the northern and central regions dominate the top 20 and middle 40 percent of the socially developed districts in Punjab. There is a clear north-south division such that the entire southern and western (excluding Mianwali) regions of Punjab lie in the bottom 40 percent of the development scale. Alternatively, in Appendix Table 3, the percentage distribution of populations for all four regions are presented according to development quartiles, and majority of the population of the southern and western areas falls in the lowest development quartiles. Mianwali is the only district in the western Punjab that does not fall in the least developed range of districts, this may be due to the fact that Mainwali is more comparable to Sargodha (in the centre) than Muzaffargarh (in the west) in terms of primary and secondary enrolment levels, and housing statistics. However, poor tertiary enrolments are almost a stark contrast to the rest of the education statistics of Mianwali. Sahiwal is a district in the central region which compares more closely with Multan and Bahawalpur from the South, than Lahore and Faisalabad in the centre. The inadequacy of shelter in Sahiwal can be drawn from the fact that Sahiwal has less than 10 percent houses with pakka walls in 1961; Multan, Bahawalpur and Bahawalnagar share similar statistics when it comes to shelter. The primary and secondary enrolment levels are very low for Sahiwal in the 1960s, and the enrolment rates actually decline further in the 1980s. The DI rankings of districts change over the two decades, however, there are no significant changes in the DI groupings of top, middle and bottom districts in 1961 and 1981. The enrolment rates for secondary and tertiary education show an upward trend

[9]Rodrik (1994) discusses the importance of initial conditions in the context of Korea and Taiwan, and a socioeconomic development index derived from factor analysis and created by Aldeman and Morris (1967) is referred by Rodrik to determine the initial conditions prevailing in the two countries. This paper makes a similar assumption and employs the 1961 development index for estimating the initial conditions of Punjab.

in the 1980s. However, on the downside average household size for Punjab increased from 5.4 to 6.2 persons per household.

Large cities and urban centres are often expected to have positive spillovers on the nearby regions, however, this cannot be said for Lahore. Lahore holds a privileged position in Punjab due to its sound social and economic statistics, Sheikhupura and Sahiwal despite being in close proximity to Lahore, do not show much improvement in their social indicators over the two decades. Figures 3 and 4 represent the spatial patterns of the districts according to the mean levels of development and standard deviations from the mean for each decade. The development levels of the districts in the eighties are less spread out compared to the sixties and majority of the districts in 1981 lie within one standard deviation below the index mean. This could also imply that during this period most of the districts in Punjab could not benefit from the growth process and development took place in pockets.

2.3. Islamisation and the Return of Democracy: 1981–1998

The democratic regime of Bhutto ended abruptly when General Zia-ul-Haq imposed a martial law in 1977. This was the dawn of the longest military regime in the history of Pakistan. Zia sought legitimacy under the banner of Islam and strategically took advantage of the Soviet-Afghan war by channelling aid and military funds into Pakistan. During Zia's regime, the country saw rising economic growth rates, industrial growth, high worker remittances and private investment. The nationalisation undertaken in Bhutto's era was reversed and so the private sector thrived [Bhatia (1990)]. However, human capital development was neglected, growth of enrolment at the primary level failed to accommodate the population growth levels. The governing elite and feudal setup disregarded education as a constructive social investment [Kardar (1987)]. Similar to the military regime in the sixties, Zia's government also overspent on defense and squeezed the funds from the social sectors. The expenditure on education fell from 2.1 percent in the mid-seventies, to 1.2 percent in 1982-83 meanwhile the population rate peaked at 3.1 percent per annum [Noman (1988)]. After the marital law, a series of short lived democratic regimes followed. The nineties are marred by slow GDP growth rates, rising inflation, large fiscal deficits and external debts, structural adjustment programmes, dwindling remittances and rising poverty levels [Zaidi (2009); Gera (2007)]. The political instability resulted in inconsistent government policies and therefore discouraged investment and fuelled capital flight. In the midst of the political and economic turmoil, social sector development also suffered. The Social Action Program (SAP) adopted in 1993 by the Pakistan's People's Party (PPP) aimed to improve living standards by investing in education, basic health, family planning, rural access to water supply and sanitation among other areas of development [Gera (2007)]. Despite the good intentions, the program could not realise sufficient improvements in the social indicators, however, it did accomplish some milestones. The high growth in primary enrolments for females (8.6 percent per annum) and males (7.7 percent per annum) in the 1990s is attributed to the Social Action Program [Gera (2007)]. Under the Peoples Party, spending on education peaked at 2.7 percent of the GDP and 0.8 percent of the GDP on health in 1996-97 [*Economic Survey* (2000-2001)]. The Muslim League alternated short governance regimes with the Peoples Party in the 1990s, although neither of the

governments could effectively follow their economic strategies, the allocation of expenditures on the social sectors of health and education were always greater in the Peoples Party regimes [*Economic Survey* (Various Issues)].

In the period of 1981-98, the top districts of Punjab (Rawalpindi, Jhelum, Lahore, Gujrat) consistently perform better and maintain their positions as the most developed districts. Faisalabad picked up in the period of 1961 to 1981 and rose from below mean levels of development (Figure 2) in 1961 to the fifth ranked district of Punjab in 1981. Faisalabad holds its position in the district rankings throughout 1981 to 1998 and undergoes growth in the enrolment of females across all education levels and expansion in access to water at the household level. Over the period of 1981 to 1998, Bahawalpur shows progress in its development indicators and enters the category of the middle ranked[10] districts of Punjab. Bahawalpur's progress can be attributed to the improvement of most of its indicators in all three sectors. Mianwali on the other hand slips down in its ranking as it undergoes an 11 percent increase in average household size and deteriorating housing statistics, this indicates inadequate provision of shelter and therefore deteriorating living conditions.

Furthermore, during this period the population distributions for the regions (Appendix Table 3) spread over a wider range of development quartiles, smudging the north-south divide. The population in the centre and southern districts spread over the development quartiles in a more even manner, similarly, the population in the northern districts is no longer restricted to the top development quartile. As Multan's population expands, its statistics in the area of shelter deteriorate at a much faster rate than in other areas of development. The availability of water declines by a staggering figure of 45 percent and the prevalence pakka roofs also declines. Although enrolment levels rise in Multan, but the growth in literacy levels for Multan is much slower than the average growth in literacy of the province. Rahim Yar Khan is one of the least developed districts of Punjab and ranks amongst the bottom three districts in all decades except 1998. Even though the development levels in Rahim Yar Khan remain below mean, but in 1998 the district shows overall improvement in development statistics and moves up in the ranking order.

2.4. The Unplanned Development: 1998-2008

In 1998, Pakistan tested its nuclear devices and as a consequence faced economic sanctions by the developed countries. Pakistan's third military coup led by General Pervaiz Musharraf followed in 1999, and the economy continued to stumble on a slow growth path. However, everything changed after September 2001, Pakistan became an ally of the United States in the war against terror and as a result economic sanctions were removed, loans were rescheduled and aid started to flow in once again [Zaidi (2009)]. The economy turned around as growth rates started to rise, the fiscal deficit reached its lowest in two decades, exports crossed the $10 billion mark and remittances started flowing in [Zaidi (2009)]. However, there was no clear strategy to sustain this growth, and eventually the growth rates started to taper off. The policies focused on stabilisation as opposed to dynamism and contractionary fiscal policies were mostly pursued. Private fixed investments remained stagnant and the manufacturing sector declined as the domestic goods failed to compete with cheaper imports from China [Zaidi (1999)]. The

[10]Middle 40 percent districts in Appendix Table 2.

focus on human development also remained unsatisfactory as the expenditure on education as a percentage of GDP approximated around 2 percent, and that on health was less than 1 percent for the entire period. The greatest success of the policy makers was in increasing the primary enrolment levels of students and decreasing the gender gap at this level. The private sector participation in the education and health sectors also increased and in the year 2007-08 the share of private institutions stood at about 33 percent of the total educational institutions [*Economic Survey* (2007)]. The number of educational institutions and healthcare centres increased in the period of 1998-2008, however, little importance has been given to improving the quality of service delivery in these sectors [Zaidi (2009)].

In the last decade of 1998-2008 a new district from the centre region of Punjab has emerged from the middle ranks and made it into the top districts. Sialkot joins the ranks of Rawalpindi, Jhelum and Gujrat as one of the most developed districts of Punjab. Sialkot's greatest achievement is in improving its education and housing statistics, the literacy rates for males and females have increased by 17 and 35 percent over the decade, similarly, living conditions have improved as the housing structures have shifted away from mud walls and roofs to concrete constructions. Development in Sialkot has occurred on the back of small scale manufacturing and the district is emerging as a thriving local market for exports. However, the neighbouring districts of Sialkot have not benefited much from any spillovers, Sheikhupura and Gujranwala fall in the middle 40 percent of the district rankings and remain on a slow path to development. Lahore district, the capital of Punjab has declined in the level of development relative to other districts and is no longer in the top twenty percent. Part of the reason why Lahore's ranking has declined is the massive influx of population from other districts and slow growth of resources per person. Although Lahore is better off than most districts in terms of availability of large public hospitals and treatments of patients, it has seen slow annual growth rates in literacy and enrolment levels at the secondary and tertiary level as compared to the average growth rates for the province.

Unfortunately, even for the final decade, as you move from the northern to the southern districts, the level of development continues to decline. In 1998, the district rankings shuffle such that the entire west, most of south and some centre districts fall in the category of least developed districts. Bahawalpur is the only district in the south that qualifies for the middle tier of development. However, in 2008, Bahawalpur falls back in the bottom group of districts, this is mainly due to deteriorating statistics in health indicators, slow enrolment growth rates at the secondary education level and large average household sizes. Mianwali moves back to the middle 40 percent (after slipping down in development ranking in 1998) of the developed districts as adequate shelter and water becomes more readily available to the people, similarly the literacy levels show improvements, especially for females.

In 2008, a north-south divide re-emerges and the 1961 patterns are seen once again. With the changing population dynamics, the population distributions of regions according to development quartiles for 2008 differ slightly from those of 1961 (see Appendix Table 3). The northern and western districts' population distributions are almost identical to their 1961 counterparts. The population in the centre districts remains evenly distributed across the quartiles and return to their initial distribution of 1961, majority of the centre's population now lies in the second quartile as opposed to falling in the first quartile in 1998.

For the southern districts, majority of the population has been upgraded from the bottom quartile (1961) to the third quartile in 2008. Nonetheless the western and southern districts consistently turn up as the least developed districts in Punjab.

3. CONCLUSIONS AND POLICY SUGGESTIONS

Punjab is considered to be Pakistan's most developed and prosperous province, yet little attention is paid to the disparities entrenched within the vast expanse of Punjab. In this study, an inter-temporal analysis of the spatial patterns of development has been conducted to determine how the different districts have performed over the past fifty years. From the results it can be established that there is a clear north-south divide within Punjab, such that the northern and north-central districts consistently display higher development levels in comparison with the western and southern districts of Punjab. However, this does not imply that development did not take place in the lagging regions. To the contrary, all indicators[11] across all the districts have shown positive growth over the past five decades. The differences across districts are a result of the variant rates at which development took place.

Five indicators[12] surface as most important in determining the development rankings of the districts as they repeatedly appear in the first factors (factor loading matrices) from factor analysis. Based on the implicit interconnectedness of the education and housing variables, some stimulating assumptions can be drawn. Pakka walls generally indicate financial wellbeing, and from our results it appears that households that can afford to have pakka walls are also more likely to send their children to school. Tempting as this inference may be, this relationship may not necessarily follow the above mentioned direction and this study is limited in establishing such a causality; the purpose is to highlight the possible relationship between the two seemingly independent indicators as a topic of interest for future research.

The patterns of unequal development remain fairly consistent over the entire period and the significance of initial conditions can follow from these unchanging trends. As already mentioned, the level of development reflected in the 1961 development rankings is assumed to mirror the social and economic welfare status of the people in the early period after independence. Regions with better indicators in the early decades continue to perform better till today. Although the trends show that the initial conditions persisted for most districts, it does not necessarily imply that the initial conditions are the main driving force of development. The significance of history and initial conditions is an important area of study in economic history and studies have highlighted the correlations of historic events on the long term economic development of countries. However, a limitation of those studies, which is shared by this study, is that the causality established is mostly suggestive and the mechanisms through which historic conditions/events affect development remain unclear. There is a dearth of studies on Pakistan that evaluate the significance of initial conditions on the country's prevailing economic circumstances. This study is perhaps the first of its kind and it intends to provide a stepping stone for further research in this area.

[11]Although health facilities have grown in absolute numbers, but when district population levels are taken into account there is a negative growth in the health indicators.

[12]Female primary enrolment rate, female secondary enrolment rate, female literacy rate, male literacy rate, and percentage of households with pakka walls.

As this paper draws attention to the unchanging patterns of development across Punjab, it could provide some basic insights for the future development policies at the provincial level. So far it appears that the state maintains development levels that imitate the initial endowments of the districts and therefore to some extent it maintains the general level of inequality across regions. The high population levels impinge enormously on the state resources and unless the investments in human capital surmount the population constraint, progress cannot be achieved. The need is to identify the weaknesses at the district-level and adopt strategic and financial policies that can thrust the districts forward and accelerate the development process. Decision making at the district level is necessary to ensure effective allocation and disbursement of resources. However, with power should come responsibility, and a system of strict accountability must also be installed at the district and provincial level.

APPENDIX

Table 1

Factor Loading Matrices from Factor Analysis: 1961, 1981, 1998 and 2008

	Factor Loading Matrix-1961				
Variable	Factor 1	Factor 2	Factor 3	Factor 4	Communality
Secondary Enrol. Rate Male	0.3439	0.1183	0.073	–0.0974	0.1471
Primary Enrol. Rate Female	0.3435	0.1228	0.0524	–0.1127	0.1485
Literacy Rate Female	0.3399	-0.1485	-0.0059	–0.0591	0.1411
Literacy Rate Male	0.337	0.0997	0.0644	–0.1464	0.1491
% of HH with 'Pakka' Walls	0.3343	0.0095	-0.1589	–0.1421	0.1573
Secondary Enrol. Rate Female	0.3177	–0.2401	–0.0185	0.1286	0.1755
Primary Enrol. Male	0.3082	0.2525	0.0769	–0.1367	0.1833
Rooms per H. Unit	0.2368	0.4124	–0.0176	–0.2487	0.2883
Patients Treated	–0.047	–0.1829	0.7008	–0.2665	0.5978
Hospitals per 10,000 population	–0.1004	0.2889	0.6367	0.1367	0.5176
% of HH with 'Pakka' Roofs	0.0528	–0.4712	0.149	–0.164	0.2739
Avg. HH size	0.096	0.3693	0.097	0.6714	0.6058
Tertiary Enrol. Rate Male	0.2607	–0.3008	0.0429	0.4184	0.3353
Tertiary Enrol. Rate Female	0.2805	–0.2856	0.1608	0.3053	0.2793
Eigenvalues	7.7444	2.4240	1.4416	0.9072	
Proportion	0.5532	0.1731	0.103	0.0648	

	Factor Loading Matrix-1981				
Variable	Factor 1	Factor 2	Factor 3	Factor 4	Communality
Secondary Enrol. Rate Female	0.3461	0.0848	–0.0278	–0.1031	0.1384
Tertiary Enrol. Rate Female	0.3444	0.0526	–0.0797	–0.1573	0.1525
Primary Enrol. Rate Female	0.3243	0.233	0.0275	–0.0072	0.1603
Literacy Rate Male	0.2916	–0.2308	0.0761	0.26	0.2117
Literacy Rate Female	0.2985	–0.2551	–0.1452	0.0763	0.1811
% of HH with 'Pakka' Walls	0.2763	–0.3394	0.025	0.0571	0.1954
Hospital Beds per 10,000 pop.	0.2407	–0.3619	–0.0806	–0.2354	0.2508
Patients Treated	0.2179	–0.3105	–0.1839	–0.3655	0.3113
Secondary Enrol. Rate Male	0.2724	0.3627	0.1243	–0.0243	0.2218
Tertiary Enrol. Rate Male	0.2851	0.3368	–0.0013	–0.1328	0.2124
Primary Enrol. Rate Male	0.249	0.3191	0.1989	–0.228	0.2554
% HH with Inside Water Connections	–0.017	0.2437	–0.5711	0.1672	0.4138
Hospitals per 10,000 Population	–0.0075	–0.2358	0.5174	–0.0201	0.3238
Avg. HH size	–0.0509	0.1137	0.4854	–0.0748	0.2567
% of HH with 'Pakka' Roofs	0.1919	0.0096	–0.0187	0.6222	0.4244
Rooms per H. Unit	0.2081	0.0047	0.1986	0.4556	0.2903
Eigenvalues	7.8453	2.8187	2.0184	1.6372	
Proportion	0.4903	0.1762	0.1261	0.1023	

	Factor Loading Matrix – 1998				
Variable	Factor 1	Factor 2	Factor 3	Factor 4	Communality
Primary Enrol. Rate Female	0.3152	0.0567	–0.1527	–0.1507	0.1486
Literacy Rate Female	0.3128	–0.0988	–0.1274	–0.1572	0.1485
Secondary Enrol. Rate Male	0.3054	–0.1093	–0.1214	0.1878	0.1552
Literacy Rate Male	0.2994	0.1461	–0.2588	–0.0377	0.1794
Primary Enrol. Rate Male	0.2916	0.213	–0.2426	0.0136	0.1894
Tertiary Enrol. Rate Female	0.2839	–0.3054	0.0895	0.0858	0.1892
Secondary Enrol. Rate Female	0.2783	–0.2864	–0.0398	–0.0231	0.1616
% of HH with 'Pakka' Roofs	0.2715	–0.1308	0.1798	0.2023	0.1641
% of HH with 'Pakka' Walls	0.2597	0.1201	0.2038	–0.3391	0.2384
Tertiary Enrol. Rate Male	0.2267	–0.4139	0.1314	0.1288	0.2566
Avg. HH. size	0.1365	0.495	–0.16	0.3387	0.4040
Rooms per H. Unit	0.2574	0.2841	–0.2626	–0.0927	0.2245
Hospitals per 10,000 Population	0.0703	0.3942	0.509	0.0992	0.4293
Hospital Beds per 10,000 pop.	0.1772	0.2208	0.4435	–0.0509	0.2794
% HH with Inside Water Connections	0.129	0.0089	0.2514	–0.6378	0.4867
Patients Treated	0.2154	–0.0167	0.3251	0.439	0.3451
Eigen Values	9.021	2.131	1.909	1.4703	
Proportion	0.5638	0.1332	0.1193	0.0919	

Variable	Factor Loading Matrix – 2008				
	Factor 1	Factor 2	Factor 3	Factor 4	Communality
Literacy Rate Male	0.3128	–0.0033	0.1136	–0.0044	0.1108
Secondary Enrol. Rate Male	0.3121	–0.0401	–0.0238	0.0714	0.1047
Literacy Rate Female	0.3063	–0.0847	–0.1125	0.193	0.1509
Secondary Enrol. Rate Female	0.3015	0.0628	0.1912	–0.122	0.1463
Primary Enrol. Rate Female	0.2976	–0.1861	0.1042	0.0234	0.1346
% of HH with 'Pakka' Walls	0.2864	–0.1954	–0.0949	0.1754	0.1599
Tertiary Enrol. Rate Female	0.2857	0.0039	–0.2905	0.0327	0.1671
% of HH with 'Pakka' Roofs	0.2798	–0.0808	–0.0602	0.2639	0.1581
Rooms per H. Unit	0.2774	–0.1142	0.0412	–0.2035	0.1331
Tertiary Enrol. Rate Male	0.2224	0.1884	–0.4632	–0.1802	0.3319
Patients Treated	0.1897	0.4037	0.1738	0.0148	0.2294
Hospital Beds per 10,000 pop.	0.1294	0.383	–0.4737	–0.0694	0.3926
Avg. HH Size	0.1746	0.1671	0.3872	–0.6176	0.5898
Primary Enrol. Rate Male	0.274	–0.2187	0.2867	0.0106	0.2052
Hospitals per 10,000 Population	0.0443	0.4166	0.3513	0.6139	0.6758
% HH with Inside Water Connections	–0.0536	–0.5481	–0.0546	0.0588	0.3097
Eigenvalues	9.7198	2.0680	1.355	0.8224	
Proportion	0.6075	0.1293	0.0847	0.0514	

Table 2

Development Index Rankings for Punjab: 1961, 1981, 1998 and 2008

	1961			1981	
	DI	Districts		DI	Districts
1	3.01	Rawalpindi	1	4.22	Gujrat
2	2.94	Jhelum	2	2.20	Lahore
3	2.59	Lahore	3	1.96	Rawalpindi
4	1.24	Gujrat	4	0.97	Jhelum
5	0.74	Attock	5	0.15	Faisalabad
6	0.72	Gujranwala	6	0.13	Sialkot
7	0.65	Sialkot	7	–0.24	Sargodha
8	0.09	Sargodha	8	–0.32	Attock
9	–0.10	Faisalabad	9	–0.33	Gujranwala
10	–0.41	Mianwali	10	–0.35	Mianwali
11	–0.48	Jhang	11	–0.55	Sheikhupura
12	–0.74	Sheikhupura	12	–0.63	Jhang
13	–0.94	Bahawalpur	13	–0.73	Multan
14	–1.13	Bahawalnagar	14	–0.81	Bahawalpur
15	–1.23	Sahiwal	15	–0.87	Sahiwal
16	–1.37	Multan	16	–0.96	Bahawalnagar
17	–1.64	Muzaffargarh	17	–1.06	Rahim
18	–1.93	Rahim Yar Khan	18	–1.29	Dera
19	–2.00	Dera Ghazi Khan	19	–1.49	Muzaffargarh
	0.94	Top 20%		0.48	Top 20%
	–0.69	Bottom 40%		–0.62	Bottom 40%
	1.66	Max-Min Ratio		1.35	Max-Min Ratio

	1998			2008	
	DI	Districts		DI	Districts
1	4.55	Rawalpindi	1	4.1	Rawalpindi
2	2.50	Jhelum	2	3.1	Jhelum
3	2.28	Lahore	3	1.7	Gujrat
4	1.16	Gujrat	4	1.4	Sialkot
5	0.88	Faisalabad	5	1.3	Attock
6	0.35	Attock	6	1.0	Lahore
7	0.21	Gujranwala	7	1.0	Faisalabad
8	0.12	Sialkot	8	0.9	Gujranwala
9	–0.01	Bahawalpur	9	0.3	Sargodha
10	–0.09	Sargodha	10	–0.2	Mianwali
11	–0.60	Sheikhupura	11	–0.5	Sheikhupura
12	–0.63	Mianwali	12	–0.8	Sahiwal
13	–0.81	Bahawalnagar	13	–1.0	Multan
14	–1.11	Rahim Yar Khan	14	–1.4	Bahawalpur
15	–1.23	Jhang	15	–1.4	Jhang
16	–1.57	Sahiwal	16	–1.5	Bahawalnagar
17	–1.75	Multan	17	–2.3	Muzaffargarh
18	–2.006	Dera Ghazi Khan	18	–2.5	Rahim Yar Khan
19	–2.25195	Muzaffargarh	19	–3.2	Dera Ghazi Khan
	0.99	Top 20%		1.33	Top 20%
	–0.62	Bottom 40%		–0.75	Bottom 40%
	1.49	Max-Min Ratio		1.78	Max-Min Ratio

Table 3

Population Distribution of Regions According to DI Quartiles

	1961			
DI Quartiles	North	Center	West	South
Top Quartile	100	25.1	0	0
Second Quartile	0	46.5	29.7	0
Third Quartile	0	14.3	0	29.5
Bottom Quartile	0	15.3	70.3	70.5
Total	100	100	100	100

	1981			
DI Quartiles	North	Centre	West	South
Top Quartile	74.2	39.3	0	0
Second Quartile	25.8	35.4	26.9	0
Third Quartile	0	20.3	0.0	62.3
Bottom Quartile	0	5.0	73.1	37.7
Total	100	100	100	100

DI Quartiles	1998 North	1998 Centre	1998 West	1998 South
Top Quartile	80.9	44.8	0.0	0.0
Second Quartile	19.1	27.9	0.0	12.8
Third Quartile	0	7.9	24.5	34.7
Bottom Quartile	0	19.4	75.5	52.5
Total	100	100	100	100

DI Quartiles	2008 North	2008 Centre	2008 West	2008 South
Top Quartile	100	15.6	0	0
Second Quartile	0	54.1	29.3	0
Third Quartile	0	23.6	0.0	63.4
Bottom Quartile	0	6.7	70.7	36.6
Total	100	100	100	100

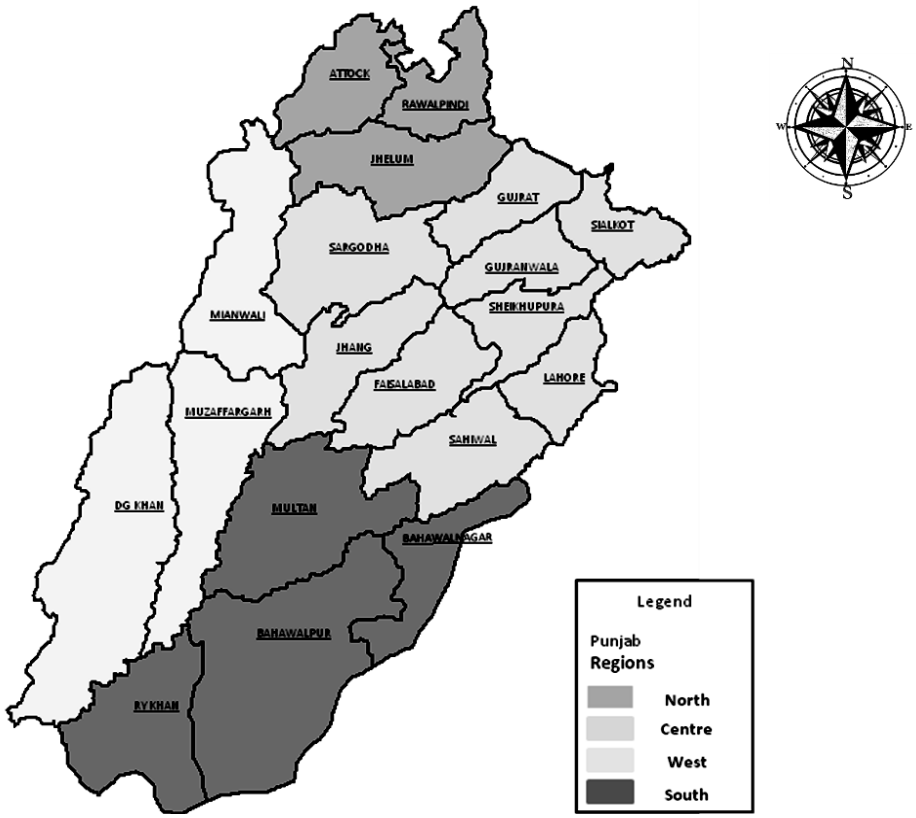


Fig. 1. Map of Punjab: Regional Division

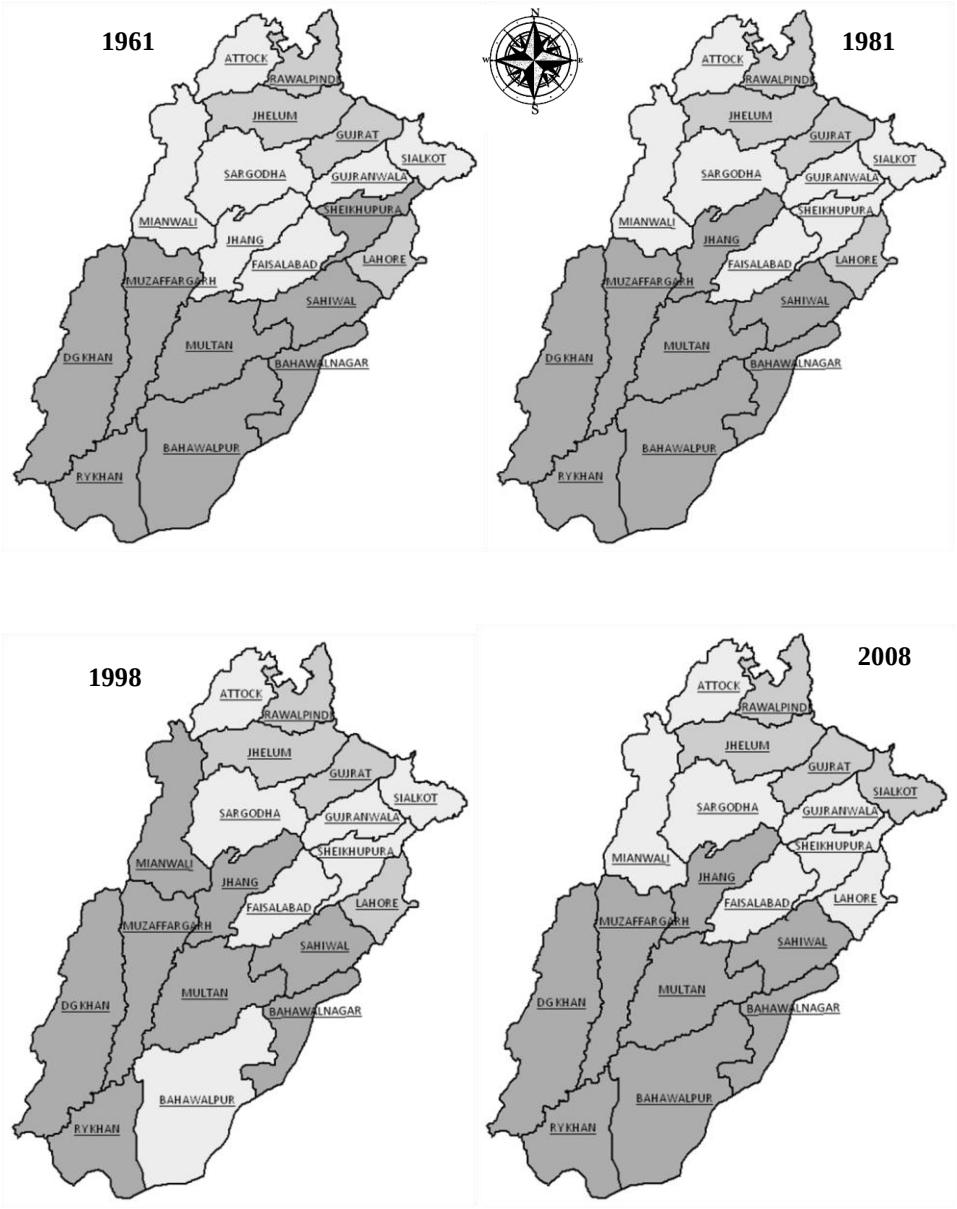


Fig. 2. Distribution of Districts—Top, Middle and Bottom Order for Punjab: 1961, 1981, 1998 and 2008

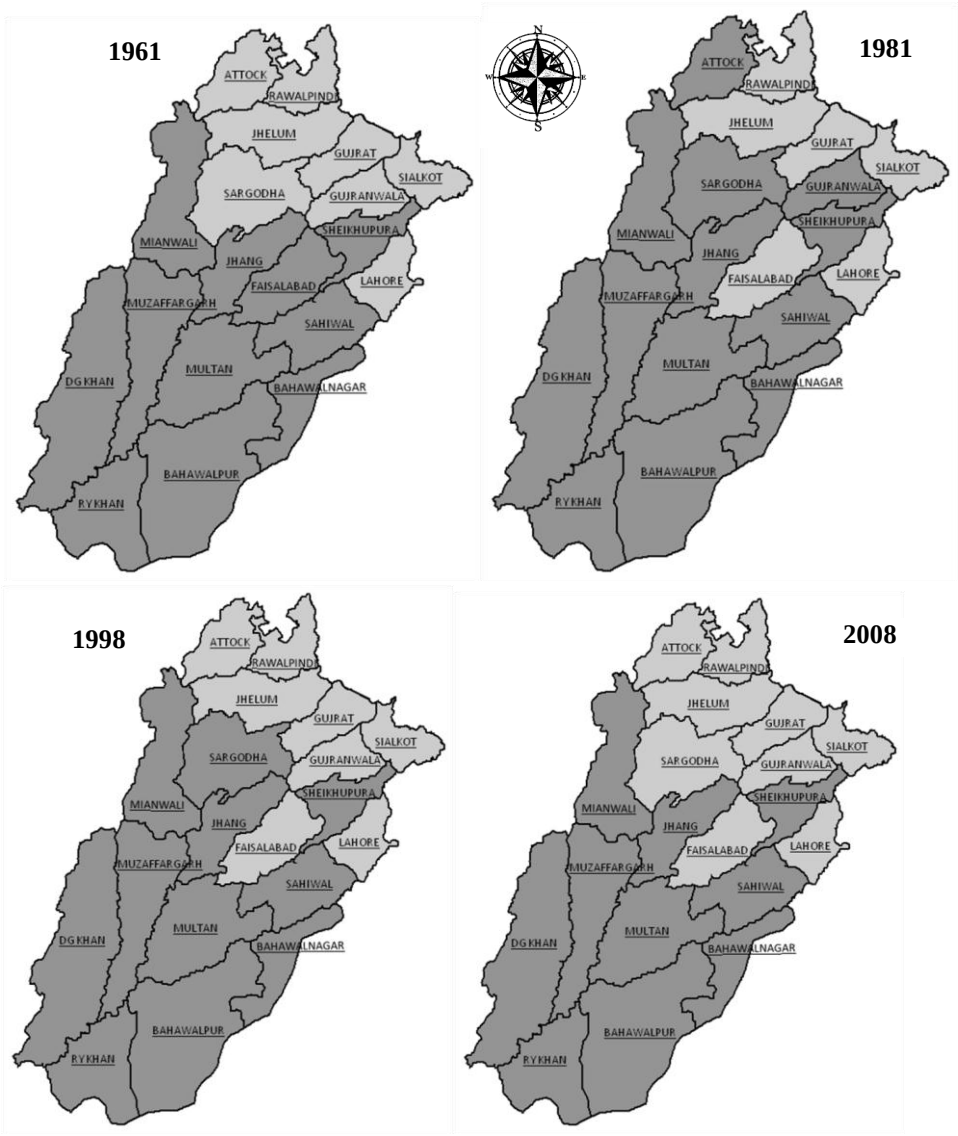
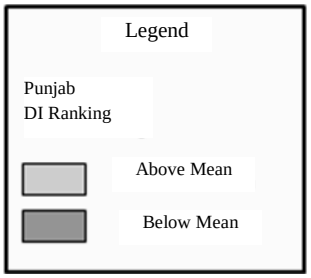


Fig. 3. Distribution of Districts from the DI Mean Levels for Punjab: 1961, 1981, 1998 and 2008



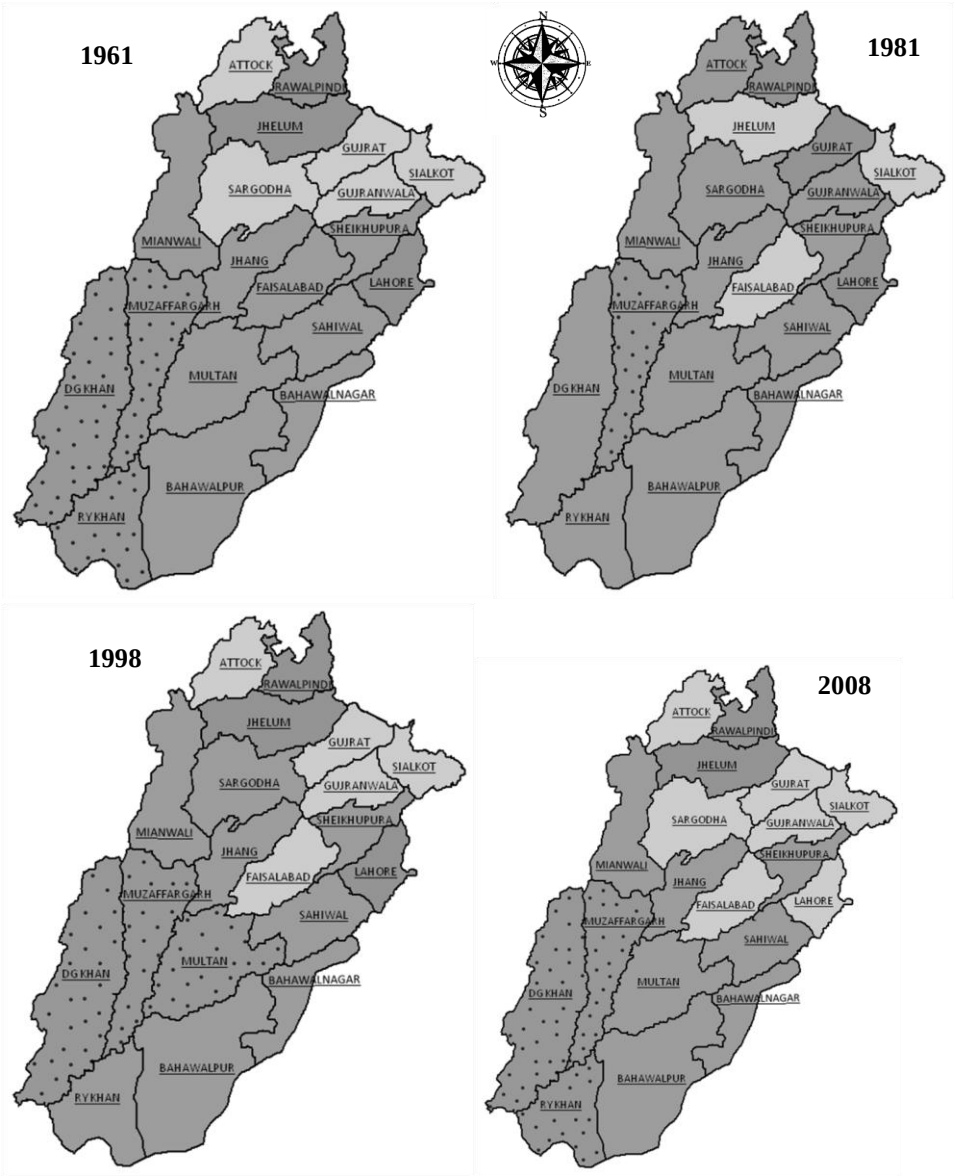


Fig. 4. Standard Deviations from the DI Mean Levels for Punjab: 1961, 1981, 1998 and 2008

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Variation in the Quality of Life within Punjab: Evidence from MICS, 2007-08

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1. INTRODUCTION

Since quality of life research is essentially concerned with measuring and monitoring welfare. In order to measure quality of life, one must have a theory of what makes up a good life [Cobb (2000)]. There is a variety of such theories and notions of what constitutes a 'good life' and correspondingly different concepts of welfare and quality of life have been developed. Various approaches and operationalisations are to be distinguished, each of which reveals a different concept of welfare and thus highlights different components and dimensions [Noll (2000)]. Among the various efforts to operationalise welfare in general and the quality of life concept in particular, two contrary approaches are to be distinguished, which define the two extreme positions on a broad continuum of concepts currently available: the Scandinavian level of living approach [Erickson (1993)] and the American quality of life approach [Campbell (1976)]. The Scandinavian approach focuses almost exclusively on resources and objective living conditions, whereas the American approach emphasises the subjective well-being of individuals as a final outcome of conditions and processes.

A more recent and to some respect similar concept of welfare and quality of life is that of 'capabilities', which has been developed by Amartya Sen. This approach is "based on a view of living as a combination of various 'doings and beings', with quality of life to be assessed in terms of the capability to achieve valuable functionings" [Sen (1993)]. This notion of welfare and quality of life has also been elaborated within the 'Human Development Approach'. The World Health Organisation defines as the individual's perception of their position in life with the context of culture and value systems in which they live and in relation to their goals. The Organisation of Economic Cooperation and Development prefers to define as the 'aggregate wellbeing of a group of individuals', and

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'societal wellbeing' to describe the evaluation of institutional structure of society [Schuessle (1985)].

As measures of welfare or quality of life, social indicators are required to display specific characteristics. First, they should be related to individuals or private households rather than to other social aggregates. Secondly, they should be oriented towards societal goals. Thirdly, they should measure the output not the input of social processes or policies. As welfare indicators, social indicators always have a direct normative relationship and one should be able to interpret changes in indicators unequivocally as improvement or deterioration in quality of life.

The assessment and monitoring of wellbeing is also the major focus of the broader field of quality of life research. Lane (1994) focuses on the relation between the subject elements and object circumstances when defining quality of life. The subject elements consist of a sense of personal development, learning, and growth, known as "quality of persons". The objective circumstances consist of opportunities for exploitation by the person living a life taken as quality of conditions. So quality of life can be taken as a function of quality of persons and quality of conditions. These two concepts are deliberately separated because the capacity to enjoy life is clearly different from achieving such capacity.

Regional disparity in quality of life is a common phenomenon in both developed and developing economies. It is more acute and glaring in the case of the latter in its manifestations because of differences in levels of development and incomes. It is particularly cause of concern in Pakistan due to its size, diversity and wide range of resource endowment. In Pakistan's sixty three years, most governments have neglected the overall wellbeing of people. In the recent past a high economic growth has resulted in disproportionate social development. Given the relatively, high population growth, high incidence of poverty, low literacy rate, low life expectancy, high infant and maternal mortality rates, poor basic civic amenities and residents' ability to afford such services have significantly differentiated quality of conditions and quality of persons between districts. Lower quality of life may affect population redistribution and in turn influence resource allocation among areas. The performance of government in improving quality of life has remained poor and growth in per capita GDP does not necessarily affect the improvement in quality of life. Social development ranking of districts were analysed in Pakistan by focusing on education, health, housing and other social services. Siddiqui (2008) views, that government provision of social services affects human capabilities significantly. She analyses that aggregate statistics at the national or provincial level hides region specific reasons of poverty and inequalities. The variations in these indicators across the districts within a province and across the provinces are an indicative of regional disparities in terms of health, education and the quality of life [UNDP (2003)]. Wellbeing by objective and subjective indicators were also analysed indicating that all the provincial capitals are ranked in high wellbeing category [Haq (2009)]. It may be noted that most of the top ranked districts are located in the province of Punjab in terms of objective wellbeing. Pasha and Naeem (1999), Cheema, *et al.*

(2008), Amjad, *et al.* (2008) and Haq and Uzma (2008) etc., also confirmed that province of Punjab is ahead of other provinces in term of social development. Estimating the variation in the sub district level is also important because a district may differ in the degree of urbanisation and industrialisation thus reflecting different socio-economic structures.

This study attempts to analyse empirically intra-district variations in Punjab at *tehsil*-level in quality of life measured by quality of persons and quality of conditions. The analysis will also provide distribution of districts and *tehsils* in four quartiles categories as good, fair, medium and poor quality of life. The paper will provide empirically based knowledge on living conditions and wellbeing of the whole province specific sub groups within a society.

The paper is organised as follows. After the brief introduction, data and methodology is presented in Section 2. A discussion on quality of life research is presented in Section 3. Concluding remarks are given in the final section.

2. DATA AND METHODOLOGY

Data

The study is based on "Multiple Indicator Cluster Survey" (MICS) Punjab 2007-08, which is a provincially representative survey of households, women and children. The survey provide estimates on more than 70 indicators for the province, area of residence (major cities, other urban and rural), 9 divisions, 35 districts and 143 *tehsils* or towns with sample size of 91,280 households. The sample was selected in two stages. Within each of the 273 sampling domains, enumeration areas were selected with probability proportional to sample sizes. Household listing was carried out within each randomly selected enumeration areas and a systematic sample of 12 households in urban areas and 16 households in rural areas was randomly drawn.

The Punjab MICS 2007-08 fulfils an important role in monitoring progress towards attaining goals and targets of the Millennium Development Goals for which Pakistan is a signatory. It also allows the provincial government and districts to gauge and monitor their respective status of human and social development with precise data on a variety of key indicators. It will assist the decision-makers to move towards new avenues of human and social development.

Quality of Life based on Quality of Persons and Quality of Conditions

In this study quality of life is analysed in terms of two major dimensions: quality of persons and quality of conditions. To measure quality of life four domains are taken, i.e., education, health and housings which are also taken by Siddiqui (2008), Jamal and Amir (2007), Akhtar and Sarwer (2007) for districts rankings of Pakistan. To identify the right of child states, child protection domain is also included. The variation in these indicators and statistics are given in Table 1.

Table 1

Variations in Quality of Life Indicators in 2007-08. (%)

	Mean	Minimum	Maximum	Co-efficient of Variation
Quality of Persons				
Underweight Children < 5 Years	33.68	16.10	63.0	24.14
Stunting	42.42	21.80	71.90	22.94
Wasting	13.40	6.0	42.2	40.67
Child Labour	4.48	0.20	20.20	84.38
Child Labour with School	3.27	0	19.0	95.41
Antenatal Care	53.38	12.5	89.30	30.29
Skilled Personnel	43.17	5.2	92.90	40.24
Delivery Facility	38.62	4.0	88.0	42.18
Postnatal Care	41.50	5.20	92.90	40.58
Contraceptive Use	31.3	1.9	59.0	35.81
Unmet Need of Family Planning	25.9	7.1	55.1	33.40
Chronic Cough during last 3 Week	2.09	0.1	10.70	87.08
Tuberculosis	0.33	0	1.70	57.58
Hepatitis	0.69	0	3.10	56.52
Adult Literacy Male 15-24 Years	79.59	32.1	97.3	13.15
Adult Literacy Female 15-24 Years	67.0	12.60	97.10	27.76
Gender Parity at Primary	0.96	0.52	1.26	11.46
Gender Parity at Secondary	.89	0.38	1.55	21.35
Unemployed Seeking Job	6.8	2.3	18.9	42.94
Quality of Conditions				
Access to Health Facility	72.93	21.80	99.60	23.98
Access to Primary School Male	93.50	56.60	100.0	6.95
Access to Primary School Female	91.4	49.9	100.0	9.34
Access to Middle School Male	64.32	16.1	98.5	25.48
Access to Middle School Female	64.94	13.4	99.4	27.61
Access to Secondary School Male	50.60	7.80	97.6	32.57
Access to Secondary School Female	46.90	6.5	96.4	38.32
Gas usage as Fuel	74.35	0.30	99.7	34.03
Electricity	91.89	32.0	100	10.51
Drinking Water	96.31	68.50	100	5.50
Sanitation Facility	69.2	15.60	98.7	25.87
Waste Water	51.83	0	99.8	54.35
Solid Waste	14.1	0	98.0	120.57
Birth Registration	78.88	8.2	100.0	26.23
Crowding	3.71	2.40	4.7	10.78
Ownership of Durable Goods Index	41.13	15.71	75.31	26.19

Source: Computations are based on "Multiple Indicator Cluster Survey" (MICS) Punjab 2007-08.

Following are the domains applied in principal component analysis.

Health

(1) Adult health: It is measured by three indicators i.e., percentage of population reported a diagnosis of chronic cough, tuberculosis or hepatitis.
(2) Child Health: It is measured by malnourishment based on anthropometric measurement. Prevalence of underweight (weight for age), stunting (height for age) and wasting (weight for height) among children under 5 years of age.
(3) Maternal health: Percentage of married women aged 15-49 having antenatal care, delivery at health facility, health personnel, postnatal care, current use of contraception and unwanted pregnancy measured as unmet need of family planning.
(4) Access to health facility private or public.

Education

(1) Adult literacy male and female 15-24 years.
(2) Gender parity at primary, gender parity at middle and secondary.
(3) Access to primary, middle and secondary school for male and female.

Child Protection

(1) Child labour: Child age 4 to 15 involved at least 1 hour of economic work. The percentage of child labourers and those who are also attending school.
(2) The percentage of children under 5 years of age whose birth is registered.

Environment

(1) Safe drinking water: Improved source of drinking water include piped water, public tap, hand pump, motorised pump, tubewell, protected well.
(2) Proper disposal of waste water and solid waste.
(3) Crowding: Number of persons per room.

Socio-economic Development

(1) Unemployed and seeking jobs.
(2) Electricity and gas usage.
(3) A composite index for ownership of durable goods: Composite index of TV, telephone, mobile phone, computer, fridge, air conditioner/cooler, cooking range, stitching machine, iron, water pump, scooter and vehicle.

3. METHODOLOGY

Principal Component Analysis

The most commonly used techniques for aggregating social indicators are, indexing, principal component analysis and composite development indicators. This study adopts a strategy for analysing the question: a multivariate analysis on the form of Principal Component Analysis (PCA) [Murtag and Heck (1987)]. The procedure in

which a set of correlated variables is transformed into a set of uncorrelated variables (called Principal Components) that are ordered by reducing variability. The uncorrelated variables are a linear combination of the original variables. The main use of the PCA is to reduce the dimensionality of the data set while retaining as much information as possible. It does not establish weights a priori. It computes a compact and optimal description of the data set.

Principal Components Analysis (PCA) generates components in descending order of importance, that is, the first component explains the maximum amount of variation in the data, and the last component the minimum.

The Principal Component Analysis-PCA developed in this study has the form:

$$X_i = \lambda_{i1}F_1 + \lambda_i F_2 \ldots + \lambda_{ij}F_j \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

where,

X_i is the *ith* indicator

λ_{ij} is called the factor loading which represents the proportion of the variation in X_t which is accounted for by the *j*th factor.

$\sum\lambda_{ij}$ is called the communality and it is equivalent to the multiple regression coefficients in regression analysis. F_j symbolises *j*th factor or component.

Principal Components Analysis (PCA) generates components in descending order of importance, that is, the first component explains the maximum amount of variation in the data, and the last component the minimum.

To compute weighted factor score (WFS), the individual factor scores are derived from the following equation:

$$(WFS)_k = \sum ke_j (FS)_{kj} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Where

FS_{kj} represents factor score of the *k*th region and *j*th factor. e_j is the Eigen value of the *j*th factor which depicts the proportion of variation in the data set. The *WFS* is used as an index for ranking quality of life on the basis of social indicators.

Equalisation Method

Before running principal component analysis all indicators are standardised. The indicators are standardised by using equalisation method so that the indicators always lie between 0 and 1. This is done with a view to remove any scale bias and to avoid the negative sign of the indicators, if standardised following the standard rule. Following Raychoudhuri and Haldar (2008), first the Best and the Worst values of an indicators in a particular dimension are identified. In case of a positive indicator, the highest value will be treated as the best value and the lowest, will be considered as the worst value. Similarly, if the indicator is negative in nature, then the lowest value will be considered as the best value, and the highest, considered the worst value. Once the best and the worst values are identified, the following formula is used to obtain normalised values:

$$X_i = 1 - [BestX_i - ObservedX_t] / [BestX_i - WorstX_i] \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

4. EMPIRICAL RESULTS

Intra-district disparity is particularly relevant in terms of quality of life. The disparity can be articulated in terms of indicators of health, education, child protection, environment, and socio economic development. In this section the results are based on the Principal Component Analysis. The objective of its use in this instance is to 'explain' most of the variation between the regions of Punjab for its 35 welfare indicators of quality of life in terms of far fewer 'Factors'. These 35 indicators are classified into a small number of clusters each of which is associated with just one of the factors, and in this case the variables within any one cluster are likely to be quite strongly correlated with each other, but not, on the whole, so strongly correlated with variables outside that cluster.

An Initial Solution Using the Principal Components Method
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.906
Bartlett's Test of Sphericity	8480.631
Df	595
Sig	.0009

First, the study employs KMO and Bartlett's test to see the strength of the relationship among variables. Large values for the KMO measure indicate that a factor analysis is a good idea. The measure of sampling adequacy is greater than 0.906, indicating the degree of common variance among the thirty five variables is 'Meritorious' which characterised by Kaiser, Meyer, and Olkin. The value is large enough to precede a factor analysis for the data.

Bartlett's test of Sphericity is another indicator of the strength of the relationship among the variables that the population correlation matrix is uncorrelated. The observed significance level is .0009. In this study, each variable is standardised to have a mean of 0.0 and a standard deviation of ±1.0. Thus the variance of each variable is equal to 1.0, and the total variance to be explained is 35. Since 6 components are extracted, the same as the number of variables factored. Eigenvalues reflect the relative importance of the factors. The first factor always explains the most variance and has the largest Eigenvalue, the next the second-most, and so on. The sum of Eigenvalues is total variance. In this analysis first component explains 48 percent variance having 18 variables second component 9 percent, third component 6 percent, fourth 5 percent, fifth component 4 percent and sixth component have 3.3 percent variance. The cumulative variance explained by the first six factors is 76.26 percent. One main conclusion of factor analysis is that access to middle and secondary school, access to health facilities, household utilities and ownership of durable goods, adult female literacy, gender parity at secondary level and maternal health will bring greater change in quality of life than other social indicators.

For indexing quality of life, factor scores are employed which are like predicted scores for each district/sub district score for each factor. It is formed as weighted sum of factor scores following the Equation (2). The weighted factor scores are used as quality of life index for ranking districts/*Tehsils* of Punjab on the basis of the welfare indicators in Tables 2 and 4.

Table 2

Ranking of Quality of life at Districts Levels: 2007-08

Name of Districts	Quality of Life: Good	Weighted Factor Scores by Principal Component 1-6	Name of Districts	Quality of Life: Medium	Weighted Factor Scores by Principal Component 1-6
Lahore*	1	44.57	Kasur	19	–8.21
Rawalpindi*	2	23.6	Khanewal	20	–8.29
Gujranwala*	3	23.04	Vehari	21	–8.84
Gujrat	4	17.21	Khushab	22	–9.49
Sialkot*	5	16.96	Okara	23	–9.8
Faisalabad*	6	11.69	Bahawalpur*	24	–10.96
Jhelum	7	11.23	Lodhran	25	–11.05
Multan*	8	6.49	Bhakkar	26	–11.66
Sheikhupur	9	5.3	R Y Khan	27	–13.04
	Quality of Life: Fair			**Quality of Life: Poor**	
Chakwal	10	3.64	Mianwali	28	–13.15
Sahiwal	11	2.54	Layyah	29	–14.48
Sargodha*	12	0.27	DG Khan	30	–14.69
Attock	13	–0.03	Jhang	31	–14.8
M. Bahauddin	14	–0.14	Pakpattan	32	–14.87
T.T Singh	15	–0.35	Bhawalnaga	33	–15.72
Hafizabad	16	–1.36	Rajanpur	34	–20.73
Narowal	17	–2	Muzaffarga	35	–21.15
Nankana sahib	18	–3.71			

Source: Computations are based on "Multiple Indicator Cluster Survey" (MICS) Punjab 2007-08.

*Major cities located.

Ranking of Quality of Life: A District / *tehsil* Level Analysis for Punjab

This section examines quality of life in terms of quality of persons and quality of conditions in districts and *tehsils* of Punjab. Assessments of quality of life must include these two dimensions of life, since both capture different dimensions of wellbeing. Joint use of these indicators is mostly helpful to get a complete picture.

The result based on principal component analysis for assessing quality of life is presented in Table 2 and Tables 4a and 4b. The study reports the estimates at the level of district and *tehsils* (sub-districts). Province of Punjab is also divided into northern, central, southern and western regions based on, geographical boundaries, official district, regional economic differences, variations in irrigation, agriculture, and cropping patterns, differences in farm-size and land tenure patterns, and distinct historical, cultural, and linguistic influences in each region as suggested by Wilder (1999).

For rank ordering of quality of life the study employs four rating of wellbeing by making four quartiles of 35 districts of Punjab in descending order of weighted factor scores. The four quartiles are rated as good, fair, medium and poor in Table 2. The population share of each district in respective category is sum up to show the performance of quality of life.

According to weighted factor scores ranking, the top 9 districts are rated as 'good' shown in Table 2. It is observed that six major cities are located in 'good' quality of life districts. These districts also include Lahore, the provincial capital of

Punjab at the top. The district of Lahore is sub divided in ten *tehsils* out which 7 are at the top ranking whereas bottom three are ranked as 18,28 and 38 respectively as in Appendix A, indicating intra-district disparity in quality of life. District Rawalpindi which ranked at second, its top two *tehsils* are performing well but Kotli Sattian which is at the bottom within district ranked at 128 out of 143 sub-divisions. In the same way all the other districts which are rank as 'good' quality of life districts not necessary its *tehsils* are also have same ranking. It is observed access to education, access to health facilities and housing are the important variables in capturing variation in the district. It is also observed that those districts which are more urbanised and have major cities are ranked in upper quartile. Cheema, *et al.* (2008) also suggested that urbanisation co-exists with a large poor population that inhabits the periurban areas of the districts. The top 9 districts having household share of 33.07 percent in total sample of Punjab are concentrated in this category as seen in Table 3. As the Province of Punjab is sub grouped on the bases of geographical zone, central Punjab indicates highest share in 'good' quality of life while western Punjab gets zero share. In northern Punjab districts population is concentrated in 'good' and 'fair' rated quality of life while in western Punjab district population is seen in 'medium' and 'poor' quartiles of quality of life. MICS 2003-04 and 2007-08 estimated that mean per capita income and expenditure are also lowest in this region. The second quality of life categorised as 'fair' has one major city and out of 9 districts seven are located in central Punjab while two are in northern Punjab. The third quartile is termed as 'medium' quality of life where 23 percent population is residing, majority of which are from southern Punjab. The bottom quartile is categorised as 'poor' where districts from western Punjab are dominated. It shows some dynamic in variation of quality of life within districts of Punjab.

Table 3

Sub-Provincial Variation in Quality of Life Rating by Districts (%)

Zones[1]	Good	Fair	Medium	Poor	Overall
North Punjab	6.89	5.19	–	–	12.08
Central Punjab	22.20	15.31	5.32	4.77	47.08
Southern Punjab	4.01	–	17.41	4.34	25.76
Western Punjab	–	–	3.71	12.09	15.08
Overall Punjab	33.07	20.51	25.44	21.20	100

Source: Computations are based on "Multiple Indicator Cluster Survey" (MICS) Punjab 2007-08.

[1]*Note:* North Punjab**:** Rawalpindi, Attock, Chakwal and Jhelum.

Central Punjab: Faisalabad, Jhang, TobaTak Singh,Nankana Sahib, Gujranwala, Gujrat, Hafizabad, Mandi Bahauddin, Narowal, Sialkot, Kasur, Okara, Sheikhupura, Pakpattan, Sahiwal, Sargodha and Lahore.

Southern Punjab: Bahawalpur, Bahawalnagar, Rahimyar Khan, Multan, Khanewal, Lodhran and Vehari.

Western Punjab: D.G. Khan, Layyah, Muzaffargarh, Bhakkar, Khushab,Rajanpur and Mianwali.

Table 4a

Ranking Quality of Life at Tehasil Levels: 2007-08

Rank Ordering			Rank Ordering		
Name of *Tehsils*	Quality of Life: Good	Weighted Factor Scores by Principal Components 1-6	Name of *Tehsils*	Quality of Life: Fair	Weighted Factor Scores by Principal Components 1-6
Samanabad Town	1	57.93	Murree Town	37	9.94
Gulberg Town	2	56.72	Wahga Town	38	9.22
DG Buksh Town	3	51.04	Hazro	39	8.8
Shalimar Town	4	50.45	Sheikhpura	40	8.55
Rawal Town	5	47.32	Potohar	41	8.31
Ravi Town	6	43.62	Mandi Bahatian	42	7.98
Aziz Bhatti Town	7	36.23	Sargodha	43	7.62
Lahore Cantt	8	36.15	Muridke	44	7.49
Jinnah Town	9	33.98	Kallar Saidan	45	7.44
Qila Didar Singh	10	32.52	Gujjar Khan	46	6.89
Taxila	11	31.08	Boson Town	47	6.43
Madina Town	12	28.32	Sahiwal	48	6.01
Sialkot	13	27.61	Hafizabad	49	5.42
Nandipur	14	27.57	T. T. Singh	50	2.73
Aroop Town	15	26.85	Shangla Hill	51	2.31
Allama I Town	16	24.72	Chichawatni	52	2.3
Iqbal Town	17	24.47	Gojra	53	2.05
Pasrur	18	23.3	Sumundri	54	1.95
Kamoke Town	19	22.85	Sohawa	55	1.4
Khiali Shah	20	21.84	Kahuta Town	56	0.29
Gujrat	21	21.61	Bhalwal	57	0.02
Jhelum	22	21.46	Sharaqpur	58	–0.01
Shah RA Town	23	20.52	Sambrial	59	–0.15
Dina	24	20.05	Shakargarh	60	–0.49
Mumtazabad	25	18.14	Pind Dadan Kn.	61	–0.56
Sher Shah Town	26	17.67	Narowal	62	–0.64
Wazirabad	27	16.97	Fatehjang	63	–0.75
Nishtar Town	28	16.76	Okara	64	–0.84
Bahawalpur City	29	15.68	Shah Kot	65	–1.03
Layallpur Town	30	14.52	Yazman	66	–1.08
Sara-e-alam	31	14.46	Ferozewala	67	–1.26
Attock	32	12.92	Choa Saidan Sh.	68	–2.51
Daska	33	12.21	Burewala	69	–2.92
Kharian	34	11.39	Talagang	70	–3.16
Nowshera Virkan	35	10.11	Malakwal	71	–3.21
Chakwal	36	10.03	Pattoki	72	–3.28

Source: Computations are based on "Multiple Indicator Cluster Survey" (MICS) Punjab 2007-08.

Table 4b

Ranking Quality of Life at Tehasil Levels: 2007-08

Name of *Tehsils*	Quality of Life: Medium	Weighted Factor Scores by Principal Components 1-6	Name of *Tehsils*	Quality of Life: Poor	Weighted Factor Scores by Principal Components 1–6
Kamalia	73	–3.29	Darya khan	109	–12.63
Jahanian	74	–3.3	Kot addu	110	–12.73
Safdarabad	75	–3.44	Pindi Bhatia	111	–12.82
Sillanwali	76	–3.61	Piplan	112	–13.33
Chak jhumra	77	–3.74	Kallur kot	113	–13.44
Jaranwala	78	–4.62	Mailsi	114	–13.91
Khushab	79	–6.16	Hasilpur	115	–13.93
Khanewal	80	–6.51	Arifwala	116	–13.98
Phalia	81	–6.96	Tandlianwala	117	–14.77
Dunya pur	82	–7.22	Noorpur Thal	118	–15.38
Lodhran	83	–7.89	Rajanpur	119	–16.12
RY khan	84	–7.93	Pakpattan	120	–16.17
Christian	85	–8.43	Depalpur	121	–16.38
Sahiwal	86	–8.45	Fort Abbas	122	–16.41
Renala khurd	87	–8.51	Essa khel	123	–16.5
Bhakkar	88	–8.78	Bahawalnagar	124	–16.71
Kasur	89	–8.86	Mankera	125	–16.91
Kabirwala	90	–8.97	Kotli sattian	126	–16.95
Jand	91	–9.04	Keror pacca	127	–17.63
Pindigheb	92	–9.35	Shujabad town	128	–18.63
Karor lal	93	–9.47	Muzaffarghar	129	–19.48
Chunian	94	–9.6	Shorkot	130	–20.18
Hasanabdal	95	–9.79	Ahmadpur Sial	131	–20.19
Vehari	96	–10.84	Taunsa	132	–20.61
Mianwali	97	–11	Jalal pirwala	133	–20.98
Mian channu	98	–11.19	Khairpur	134	–21.77
Layyah	99	–11.44	Bahawalpur	135	–21.86
Nankana sahab	100	–11.6	Rojhan	136	–22.14
Chinniot	101	–11.6	Liaquatpur	137	–22.24
Kot momin	102	–11.71	Jampur	138	–23.17
Khanpur	103	–11.77	Jatoi	139	–27.99
Haroonabad	104	–11.96	Minchinabad	140	–28.68
Sadiqabad	105	–12.02	Ahmadpur east	141	–29.02
Shahpur	106	–12.05	Choubara	142	–29.88
DG Khan	107	–12.27	Ali pur	143	–32.17
Jang	108	–12.46			

Source: Computations are based on "Multiple Indicator Cluster Survey" (MICS) Punjab 2007-08.

In order to further explore variation in quality of life based on weighted factor scores at sub- district (*tehasil*) levels in four quartiles is also analysed. As indicated in Tables 4a and 4b ranking based on sub district level are significantly different from district level quality of life. District Rawalpindi which ranked at second categorised as 'good quality' of life, had eight sub divisions, five are classified as 'fair' and one is 'poor'. In examining the classification of quality at sub-districts level, *tehsils* of Gujranwala, Gujrat, Khanawal, Sahiwal, Narowal, Pakpattan, Rajanpur and Muzafarghar are located in their respective categories as the districts. Some districts like Bahawalpur, Hafizabad, Okara and Bahawalnagar have sub division which categorised above in terms of quality of life with their districts ranking as given in Appendix

A. Intra districts variation in quality of life can be quantified by 143 sub districts i.e., *tehsils. Tehsil* Samanabad that is located in district Lahore ranked at the top while *tehsil* Alipur located in Muzafarghar placed at the bottom. Variation in quality of life with in district can be observed in Appendix A. It is however to note that even the relatively good quality of districts have pocket low quality sub regions like Rawalpindi. Alternatively, even a relatively low ranking district has some *Tehsils* with high level of quality of life like, Bahawalpur.

Variation in quality of life at sub-district *(Tehsil)* level by provincial zone is demonstrated in Table 5. The population from each *Tehsil* in respective categories are sum up to show the performance of the quality of life in Punjab.

Table 5

Sub-District (Tehsil) Level Variation in Quality of Life (%)

Zones	Good	Fair	Medium	Poor	Overall
North Punjab	4.86	5.54	1.47	0.21	12.08
Central Punjab	16.10	17.84	9.02	4.12	47.08
Southern Punjab	2.83	2.20	11.08	9.65	25.76
Western Punjab	–	–	5.19	9.89	15.08
Overall Punjab	23.79	25.58	26.76	23.87	100

Source: Computations are based on "Multiple Indicator Cluster Survey" (MICS) Punjab 2007-08.

Identifying Quality of Life Differences in Punjab

The key question is how to explain regional variations in quality of life in districts and sub districts levels in Punjab. In other words why is quality of life considerably poor in one area than in other areas? Some explanations in terms of socio-economic development indicators are also given as:

(1) Incidence of poverty is low in 'good' quality of life regions while it is quite high in 'poor' rated districts. Per capita expenditure and income is quite high in 'good' and 'fair' rated districts as compared to 'poor' classified areas [Cheema, *et al.* (2008)].
(2) The level of urbanisation is high in 'good' quality of life districts; Lahore, Gujranwala, Faisalabad, Multan, Rawalpindi, etc.
(3) In southern Punjab, employment prospects in industry and the services sector are lower than the regions that are better connected to major centres of growth.
(4) High dependency of the rural labour force on the agriculture sector in poor districts is a cause of concern.
(5) Districts which have industrial zone i.e., Lahore, Faisalabad, Gujranwala, etc., are
(6) in are placed in top ranking.
(7) Districts which have cantonment areas i.e., Lahore, Jhalum, Rawalpindi, Gujranwala, etc in are placed in top ranking.
(8) Remittances from overseas migrants, especially from Middle East play an important role in quality of life of Pakistani people. Recent statistics shows that sixty percent Pakistani in the Middle East migrated from only 20 districts with heavy concentration from Rawalpindi, Lahore, Faisalabad and Gujranwala, etc.

(9) Inequality in land ownership is high; only less than half of all rural households own any agriculture land while the top 2.5 percent of all households account for over 40 percent of all land owned. Gini coefficient for land distribution is high in 'poor' rated quality of life districts.

(10) In north Punjab, alongside of Islamabad Rawalpindi city has generated a lot of opportunities for its rural population as well as populations from neighbouring districts, including Jhelum, Chakwal and Attock, by providing them employment opportunities, mainly in the services sector [Amjad, *et al.* (2008)].

(11) Large family size, high dependency ratio in poor districts is observed in the Population Census of Pakistan, 1998.

5. CONCLUSIONS

Quality of life is a multi-level and amorphous concept**,** and is popular as an endpoint in the evaluation of public policy. The study explores intra district variation in quality of life in Punjab by employing MICS, 2007-08 while in methodology principal component analysis is used for indexing wellbeing. The quality of life is examined through two dimensions, quality of persons and quality of conditions based on five domains: education, health, child protection, environment, and other socio economic conditions. All the thirty five districts and one forty three *Tehsils* (sub districts) are categorised in four quartiles that is good, fair, medium and poor.

According to weighted factor scores ranking, the top 9 districts are rated as 'good' quality of life districts where six major cities of Punjab are located, i.e., Lahore, Rawalpindi, Gujranwala, Gujrat, Faisalabad and Sailkot, etc. The second quality of life categorised as 'fair' has one major city and out of 9 districts seven are located in central Punjab while two are in north Punjab, i.e., Sargodha, Sahiwal, Chakwal and Attock. The third quartile is termed as 'medium' quality of life where 23 percent population is residing, majority of which are from south Punjab. The bottom quartile is categorised as 'poor' where districts from west Punjab are dominated, i.e. Mianwali, Jhang and Muzafferghar etc. Intra districts variation in quality of life quantified by *Tehsils* is quite considerable. Some district like Rawalpindi, Faisalabad, Multan and Jhelum observed significant variation in quality of life in their respective *Tehsils.* Distribution of population by geographical zones also highlights sub districts discrepancies in quality of life when comparing it with districts. Some important determinants of regional variation in quality of life are access to middle and secondary school, access to health facilities, household utilities and ownership of durable goods, adult female literacy, gender parity at secondary level and maternal health as depicted by factor components. Some explanations in terms of socio-economic development indicators are poverty rates, extent of urbanisation, overseas migration, industrial zones and geographical significance, etc.

Finally, the study has identified *Tehsils* ranked as 'poor' quality of life within each district as target for special resource allocation within Medium Term Development Framework. It is also suggested for enhancing rural-urban linkages through infrastructure development, encouraging establishment of industrial zone, regional gaps in human capital through better quality education and health facilities, agro based industries, increase access to overseas employment and credit facilities for small and medium term enterprises.

Appendix-A

Intra Districts Disparity in Quality of life in Punjab: 2007-08

Name of Districts	Tehsils Ranking within District	Overall Tehsils Ranking in Punjab	Name of Districts	Tehsils Ranking within District	Overall Tehsils Ranking in Punjab
1. Lahore	1		**7. Jhelum**		
Samanabad	1	1	Jhelum	1	22
Gulberg town	2	2	Dina	2	24
DG Buksh t	3	3	Sohawa	3	55
Shalimar t	4	4	Pind dadan	4	61
Ravi town	5	6	**8. Multan**		
Aziz Bhatti	6	7	Shah R A	1	23
Lahore cantt	7	8	Mumtazabad	2	25
Allama Iqbal t	8	18	Sher Shah t	3	26
Nishtar town	9	28	Boston	4	47
Wahga town	10	38	Shujabad	5	128
2. Rawalpindi			Jala Pirwala	6	133
Rawal town	1	5	**9. Sheikhupura**		
Taxila	2	11	Sheikhupura	1	40
Murree town	3	37	Muridke	2	44
Potohar town	4	41	Sharaqpur	3	58
Kallar sayadan	5	45	Ferozwala	4	67
Gujar Khan	6	46	**10. Sahiwal**		
Kahuta town	7	56	Sahiwal	1	48
Kotli Sattian	8	126	Chechawatni	2	52
3. Gujranwala			**11. Chakwal**		
Qila didar	1	10	Chakwal	1	36
Nandi pur	2	14	Choa saidan	2	68
Aroop town	3	15	Talagang	3	70
Kamok t	4	19	**12. T.T Sing**		
Khiali sha	5	20	Toba tk sing	1	50
Wazirabad	6	27	Gojra	2	53
Nowshera irkan	7	35	Kamalia	3	73
4. Gujrat			**13. Mandi BD**		
Gujrat	1	21	Malakwal	1	71
Sara Alamgir	2	31	Phalia	2	81
Kharian	3	34	**14. Attock**		
5. Sialkot			Attock	1	32
Sialkot	1	13	Hazro	2	39
Pasrur	2	18	Fateh jang	3	63
Daska	3	33	Jand	4	91
Sambrial	4	59	Pindigheb	5	92
6. Faisalabad			Hasan Abdal	6	95
Jinnah	1	9	**15. Narowal**		
Madina	2	12	Shakargarh	1	60
Iqbal	3	17	Narowal	2	62
Faisalabad	4	30	**16. Sargodha**		
Samundari	5	54	Sargodha	1	43
Chak jhumer	6	77	Bhalwal	2	57
Jaranwala	7	78	Sahiwal	4	86
Tandlianwala	8	117	Kot Momin	5	102
			Shahpur	6	106

Continued—

Appendix-A—(*Continued*)

17. Hafiz abad			**27. R.Y. Khan**		
Hafiz abad	1	49	R.Y khan	1	84
Pindi bhatian	2	111	Khan pur	2	103
18. Nankana sa			Sadiq abad	3	105
Shangla hil	1	51	Liaqat pur	4	137
Shahkot	2	65	**28. Mianwali**		
Safdar abad	3	75	Mianwali	1	97
Nankana sa	4	100	Piplan	2	112
19. Kasur			Essa khail	3	123
Patoki	1	72	**29. Lyyah**		
Kasur	2	89	Karor lal	1	93
Chunian	3	94	Lyyah	2	99
20. Khanewal			Chubara	3	142
Jahanian	1	74	**30. D. G. Khan**		
Khanewal	2	80	D.G khan	1	107
Kabirwala	3	90	Taunsa	2	132
Mian chanue	4	98	**31. Jhang**		
21. Vehari			Chinniot	1	101
Burewala	1	69	Jhang	2	108
Vehari	2	96	Shorkot	3	130
Mailsi	3	114	Ahmadpur s	4	141
22. Khushab			**32. Pakpattan**		
Khushab	1	79	Arifwala	1	116
Nurpur thal	2	118	Pakpattan	2	120
23. Okara			**33.Bahawalna**		
Okara	1	64	Chistian	1	85
Renala khu	2	87	Haroonabad	2	104
Depalpur	3	121	Fort Abbas	3	122
24. Bahawalpu			Bahawalnaga	4	124
B.pur city	1	29	Minchinabad	5	140
Yazman	2	66	**34. Rajanpur**		
Hasilpur	3	115	Rajanpur	1	119
Ahmadpur	4	131	Rojhan	2	136
Khairpur	5	134	Jampur	3	138
B.pur sadar	6	135	**35. Muzaffarga**		
25. Lodhran			Kotaddu	1	110
Duniapur	1	82	Muzaffargar	2	129
Lodhran	2	83	Joti	3	139
Keror paca	3	127	Alipur	4	143
26. Bhakkar					
Bhakkar	1	88			
Darya khan	2	109			
Kallur kot	3	113			
Mankera	4	125			

Source: Computations are based on "Multiple Indicator Cluster Survey" (MICS) Punjab 2007-08.

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Inter-District Inequalities in Social Service Delivery: A Rationalised Approach towards Funds Disbursement

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INTRODUCTION

For a less developed country, Pakistan has experienced a relatively high average per capita growth rate of 2.2 percent, for the period 1950-99 [Easterly (2003)]. Unfortunately, high growth rates have not trickled down sufficiently and the living condition of the general populace leaves a lot to be desired. The UNDP's Human Development Index (HDI) report released in 2010, ranked Pakistan at 144th on the HDI, out of 178 countries [Wasif (2010)]. The HDI conceptualises poverty to be a multi-dimensional construct and considers adult literacy and life expectancy to be key indicators of the quality of life. Given, that Pakistan has experienced high growth rates but ranks so poorly on the HDI, clearly indicates that despite economic growth, the country faces serious challenges in social service delivery.

The coverage of social services is limited and varies across different regions of the country. Easterly (2003) points out that in terms of adult literacy there is a huge variation across provinces and female literacy is only 3 percent in rural Balochistan and Khyber Pakhtunkhwa whereas it is 41 percent in urban Sindh. Zaidi (2005) shows that the situation is not much different in case of health outcomes. The study shows that across the country, nearly half of pregnant women suffer from anaemia and 35 percent of children under age five are malnourished. Moreover, the numbers for infant mortality vary across provinces considerably with urban Punjab having an infant mortality of 70.6 per 1,000 live births compared to the 120.6 of urban Balochistan.[1]

The variation in outcomes is not only across provinces but it is considerably large within provinces also. Cheema, *et al*. (2008) show that within districts of the Punjab province there are stark differences in terms of the severity of poverty. The severity of poverty was considerably higher in South Punjab relative to North Punjab (53 percent vs. 19 percent). Moreover, the percentage of boys (aged 15–17) never enrolled in school was

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[1]Zaidi (2005).

only 6 percent in North Punjab whereas it was 26 percent in South Punjab. It is likely that the growth process has been structured in such a way that it creates inequality and leaves certain areas behind. Clearly economic growth has not taken place uniformly and some areas are performing relatively worse than others, both in terms of social service delivery and economic growth.

Because of uneven and unbalanced growth over the last two decades, rural to urban migration has been relatively higher with people from remote and socially excluded areas migrating to the provincial capitals, metropolitans and city centres. On the other hand, a rapid transformation of rural areas into urban societies, housing schemes and residential arcades has raised concerns for policy-makers towards this upcoming phenomenon of high urban congestion. Keeping in view the above trend, the main objective of this research study is to highlight and discuss the prevailing inequalities in public service delivery within the districts of Punjab.

Researchers believe that public institutions which are supposed to serve the common man have failed in most areas of service delivery such as health, education and physical infrastructure [Ismail (1999)]. Shah (2005) created an index for "governance quality", comprising of indicators related to human development, political stability, political freedom and bureaucratic efficiency. On this index, Pakistan ranked at 66 (out of 80 countries) and was categorised as a country with poor governance. Despite, this evidence of poor governance, we believe that as researchers it is imperative that we provide the Government with an accurate methodology, which will enable it to supply social services more effectively. In this paper, we address the important issue of inequitable access to social service delivery, which has left certain regions of Pakistan lagging behind others. We then evaluate the role of the private sector in addition to the government in providing access to social services. We develop a methodology which will allow the Government to effectively target deprived areas, which have limited access to basic services such as health, education and physical infrastructure.

The paper is going to be divided into four sections. In the first section, we wish to establish theoretically, a positive relationship between social service delivery and poverty reduction. The second section encompasses the different methodologies employed for our work, along with a brief note on the data used for this study. The third section will calculate the inequality in access to social services at the district level for Punjab and ascertain which districts have very limited access. The contribution of the private sector in reducing inequality in access to basic services will also be discussed. Furthermore, we will analyse whether the provision of these services at districts varies as the distance from the provincial capital is increased. The final section will conclude and discuss the policy implications of our study.

1. LITERATURE REVIEW

1.1. The Illusion of a Tradeoff

Previous research has focused on the relationship between income inequality (or asset inequality) and economic growth. Banerjee and Newman (1993) show that the pattern of occupational choice in an economy can depend on the initial distribution of wealth. They propose that initial wealth levels will decide what occupation an individual

enters, and can lead to differences in talent over time. Given that bequests are also possible, poverty and inequality can continue for generations and credit market imperfections coupled with differences in initial wealth endowments could restrain the poor from acquiring the skills they need to escape from poverty.

If the poor cannot easily access credit markets, the historically impoverished may not have the necessary wealth to acquire human capital. Nor, can they place their returns from human capital as collateral ex-ante, for formal and informal lenders would be unwilling to accept this exchange [Ray (1986)]. Occupational diversification would then become even more difficult for the poorer segments, and they could be caught in low return occupations.

Similarly the poorest in rural areas, are extremely vulnerable to exogenous shocks and a bad crop or lower food prices could lead to a withdrawal of a child from school or a drop in the health status of children. There is also empirical evidence supporting the proposition that higher wealth levels increase the ability to smooth consumption and income in rural areas [Morduch (1995)]. Therefore, initial inequality in asset holdings prevents the poor from insuring themselves and they are more vulnerable to exogenous shocks, which could plunge them into further poverty.

The above arguments link income inequality with the probability of being poor. If some groups are extremely poor to begin with, then in all likelihood they will remain so. We do not question this proposition but investigate the channel through which this is likely to happen. We argue that the poor are unable to break away from a poverty trap because they do not have access to certain markets and services. Due to lack of access to social services, groups that are inherently poor have limited opportunities to escape from a vicious poverty cycle.[2] If they have the opportunity to access certain services such as education, then they could occupationally diversify and enter jobs with higher returns. Our paper is based on the premise that access to public goods is the key to climbing up the income ladder.

Public goods play an extremely important role in building the capabilities of individuals and promoting economic development. The role of health and education in helping individuals pursue a more purposeful life is well recognised in economic literature [Dreze and Sen (1995)]. Provision of these services becomes even more critical as the rich may have the option to use private medical and education facilities, while the impoverished, because of their wealth levels are unlikely to have this choice [Besley and Ghattak (2004)]. For Pakistan, Ghaus, *et al*. (1996) empirically demonstrate that social services such as education are strongly correlated with the overall development of a region. Consequently, an equitable access to these services should not affect growth negatively through the channels discussed above. In fact, a more equal and greater access to these services will result in a breakdown of the tradeoff between equity and growth.

The provision of public goods is dependent on the allocation of Government expenditures. In a poor country with malnutrition and an illiterate population, the marginal benefits from a unit of education and health are far likely to exceed that on military. For instance, if provision of health services was easily and cheaply available and

[2]We acknowledge that just considering access to public goods maybe insufficient and it is important to scrutinise the quality of services being provided by the public sector also. Unfortunately, the dataset that we used had very limited information about the quality of public good provision.

an earning member of the family got sick, the poor would access those services and the loss in income would be relatively less. Subsequently, under-provision of these social services will contribute deeply to poverty and human deprivation. The destitute rely on the state for utilising these basic services. The State can offer them services such as health, education, physical infrastructure and safety nets to shield them from the adverse effects of negative shocks to their income. Easy access to education can serve as a means for the poor to acquire the necessary human capital and move up the income ladder.

Article 37 of the Constitution of Pakistan states that it is the responsibility of the State to "*promote with special care the educational and economic interest of backward classes or areas*" and Article 38 goes even a step further in making it obligatory for the State, to provide *"basic necessities such as food, clothing, housing, education and medical relief for all such citizens irrespective of sex, caste, creed or race"*. Clearly, the State has acknowledged and recognised its duty to provide broad-based public goods, without discrimination. Unfortunately, the Pakistani Government has failed in this obligatory duty and access to basic services such as health and education is not that widespread. It has been shown that the social indicators of the country vary across provinces and within provinces also.

For this paper, we will scrutinise the unequal access to basic services, for the Punjab province. As a result of the recent signing of the 7th National Finance Commission (NFC) award, provinces are now getting a larger share from the Centre. The provincial share has increased from approximately 48 percent to 56 percent and Punjab is receiving nearly 51 percent of the total funds [Akhtar (2010)]. It is of grave importance to consider how these funds are allocated and whether they are allocated efficiently to the poorest districts of the Punjab province. Efficient coverage would imply that these limited funds are reaching those who need them the most and the populace of those regions is provided with easy access to social services.

This research study is aimed at analysing access to three services that lie under the public domain; education, health and physical infrastructure.[3] The poor cannot occupationally diversify and cannot move to high return occupations because they lack the necessary human capital. Provision of physical infrastructure such as solid waste disposal and quality fuel for cooking, reduces the probability of a family member getting ill and will reduce the health costs incurred by a poor family. Safety nets serve as an insurance mechanism for the poorest and protect them from the adverse effects of exogenous shocks. Thus, the destitute and poor are heavily reliant on the State to provide them with these services and in the following section, we will setup the methodology for our study.

2. METHODOLOGY

This section will describe the data sources and variables used for this study. We will detail the methodology used and will relate it to the research objectives.

[3]In an earlier version of the paper presented at the 26th Annual General Meeting and Conference of the Pakistan Society for Development Economists, we included the social safety nets index but the index was underestimated. To ascertain whether efficient coverage of these services was being provided, we required two questions i.e. "Did you require any assistance in the form of social safety nets?" and "Did you receive any assistance?" but we just had the latter and not the former. Due to this problem, we could not tell whether individuals who required assistance actually received it or not.

2.1. Data Sources

The analysis of the study is based on micro-level household data, collected by the Bureau of Statistics, Government of Punjab. The study utilises Multiple Indicator Cluster Survey 2007-08 [MICS (2007-08)][4] dataset for measuring inequality in access to public service provision in all the districts of Punjab.

Throughout the paper, we frequently use the word "community", which refers to the enumeration block represented by the sampled 12 households in the urban areas and 16 households in the rural areas. Thus an enumeration block is a community and MICS 2007-08 represents this community with data on 12 households in urban areas and 16 households in rural areas.

We have utilised the following indicators for calculation of the Gini Coefficients.

Table 1

Description of Variables

Variable Name	Description of the Variable
HEALTH (Total 6 Indicators)	
IMMUNIZE	Proportion of Children and Infants who received immunisation
VITAMIN	Proportion of Children and Infants who received Vitamin-A Dosage
IANC	Proportion of Women who received Pre-Natal Care from Improved sources (Doctor, Nurse/midwife, LHW, LHV)
IASST_BIRTH	Proportion of Women who received Assistance during birth from Improved sources (Doctor, Nurse/midwife, LHW, LHV)
IPNC	Proportion of Women who received Post-Natal Care from Improved sources (Doctor, Nurse/midwife, LHW, LHV)
G_HEALTH	Proportion of population with access to **Government** health Facility
HEALTH	Proportion of population with access to any health facility (public or private)
EDUCATION (Total 10 Indicators)	
G_PRIMARY	Proportion of Children (age 5 to 9) with access to **Government** Primary School
PRIMARY	Proportion of Children (age 5 to 9) with access to Any Primary School (public or private)
GSEC_B	Proportion of boys (age 10 to 13) with access to **Government** Elementary School
SEC_B	Proportion of boys (age 10 to 13) with access to Any Elementary School (public or private)
GSEC_G	Proportion of girls (age 10 to 13) with access to **Government** Elementary School
SEC_G	Proportion of girls of age 10 to 13 with access to Any Elementary School (public or private)
GHIGH_B	Proportion of boys (age 14 to 16) with access to **Government** Secondary School
HIGH_B	Proportion of boys (age 14 to 16) with access to Any Secondary School (public or private)
GHIGH_G	Proportion of girls (age 14 to 16) with access to **Government** Secondary School
HIGH_G	Proportion of girls (age 14 to 16) with access to Any Secondary School (public or private)
SANITATION (Total 2 Indicators)	
GSWASTE	Proportion of population with access to **Government** provided access to solid waste collection and disposal
SWASTE	Proportion of population with access to solid waste collection and disposal (public or private)
INFORMATION (Total 2 Indicators)	
MEDIA	Proportion of population with access to media (Possession of TV, Cable TV, Radio)
TELEPHONE	Proportion of population with access to telephony (Possession of telephone, mobile, internet)
OTHERS (Total 3 Indicators)	
UTILITY_STR	Proportion of population with access to Utility Stores
GC_FUEL	Proportion of population with access to **Government** provided fuel for cooking (Electricity and Natural Gas)
C_FUEL	Proportion of population using Good Fuel for Cooking (Electricity, LPG, Natural Gas and Bio Gas)

[4] For more details see Punjab (2009).

The Gini coefficient is a measure of inequality within the values 0 to 1, both inclusive. It is frequently used for measuring income inequality amongst households. The closer the value is to 0, the lesser the income inequality. We are going to calculate the Gini coefficient for public service delivery at the district level.

2.2. Gini Coefficient Calculations

We calculate the Gini coefficient for our data using the below formula

$$G = \frac{2}{n^2 \bar{x}} \sum_{i=1}^{n} \left(\left(i - \frac{n+1}{2} \right) x_i \right) \qquad \textit{Where} \quad \bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i$$

x_i = Information of ith ordered Community observation.
n = Number of communities in a district.

Gini coefficients were calculated at the district level, for all the variables listed in Table 1 above.

2.3. Public and Private Sector Linkage

Public-private sector partnership has recently gained importance in policy formulation. Private sector investments in public sector projects coupled with project supervision, technical assistance and human capital provision have improved the efficacy of the public sector. By making such investments more targeted and need oriented the private sector can by and large improve the level of access to basic services.

For Pakistan, especially in the rural parts of the country where almost two third of the whole population resides, access to education and health through state funded institutions is limited. However, through the participation of private sector, access to these services has improved. A recent study shows that the number of private schools has increased from 32,000 to 47,000 within the time period 2000–2005 and *"one in every 3 enrolled children at the primary level was studying in a private school"* [LEAPS (2008)]. We would like to ascertain the contribution the private sector has made in reducing unequal access to these basic services.

Using the MICS 2007-08 dataset, we can assess the state's contribution towards social service provision and the overall provision by both the public and private sector. The difference between the two reflects the contribution of the private sector in reducing inequalities in social service delivery. For example, first we have calculated the Gini coefficient for access to primary schooling through state funded (public) institutions only. Then we compare this value with the Gini coefficient calculated for access to primary schooling through any type of institution (either private or public). In this way, the simple comparison can reveal the contribution made by the private sector. Thus, higher the absolute difference of the Gini coefficients, the greater the effectiveness of the private sector in lowering inequalities in access to such services.

2.4. Inequality and the Distance from the Provincial Capital (Lahore)

Another objective of the study is to relate the inequality measurements with the distance from the provincial capital, Lahore. Due to unavailability of any published data,

we tried to calculate the distance between Lahore and other districts of Punjab using the software Google Earth™. For all the districts, we located the value of latitude and longitude[5] and used the haversine formula for calculating the distance using the longitude and latitude of the two different locations.[6]

For any two points (lat1, long1) and (lat2, long2) such that lat represents the latitude and long represents the longitude for each point, we can calculate the distance between the two using the haversine formula [Montavont and Noel (2006)].

$$haver\sin\left(\frac{d}{R}\right) = haver\sin(\Delta_{lat}) + \cos(lat_1)\times\cos(lat_2)\times haver\sin(\Delta_{long})$$

And the Haversine function is given by $haver\sin(\delta) = \sin^2\left(\frac{\delta}{2}\right)$

So $d = R\times haver\sin^{-1}(h) = 2R\times\arcsin\left(\sqrt{h}\right)$

Such that R is the radius of the earth and has the constant value of 6371 i.e. R = 6371 km.

2.5. Composite Index Formulation

For the present study, we have calculated the Gini coefficients for a total of 16 different indicators given in Table 2, below. These indicators represent overall access to these services, irrespective of whether a public or private institution provides them. We can group these variables in five different public service categories namely health, education, sanitation, information and others. From these variables we will be constructing a composite index.

Table 2

Indicators Used for Composite Index Formulation

HEALTH	IMMUNIZE, VITAMIN, IANC, IASST_BIRTH, IPNC, HEALTH
EDUCATION	PRIMARY, SEC_B, SEC_G, HIGH_B, HIGH_G
SANITATION	SWASTE
INFORMATION	MEDIA, TELEPHONE
OTHERS	UTILITY_STR, CFUEL

In order to see if there is any relationship between inequality and the distance of these districts from Lahore, we used composite indices, created from the variables given in Table 2. Following the approach used by Adelman and Dalton (1971), Pasha, Ghaus, and Ghaus (1996) and Jamal and Khan (2003), we use Factor Analysis (FA) technique for data reduction and convert several variables into a composite index.[7] The Factor analysis helps reduce the number of possible relationships by either grouping the

[5]For most districts, the district name is synonymous with that of a key city e.g. there is a Faisalabad city within Faisalabad district. We have found the latitude and longitude of this city for each district and calculated the distance of that city from Lahore.

[6]District Data with respective values of longitude and latitude can be provided upon request.

[7]See [Adelman and Dalton (1971); Jamal and Khan (2003)] for details on the methodology.

variables or clustering the variables. It considers the variables exhibiting high correlation with each other and converts them into one factor or component. So a Factor Analysis model can be described as follows:

$$X_i = a_{i1}F_1 + a_{i2}F_2 + a_{i3}F_3 + \ldots\ldots + a_{ij}F_j$$

Where

X_i is the *i*th Indicator.
a_{ij} is the proportion of the variation in X_i accounted for by the *j*th factor (It is also called factor loading).
F_j is the j^{th} factor or component.

For any number of variables, Factor Analysis generates components. These components are produced in a descending order of importance so the first component explains the maximum amount of variation in the data and the last component, the minimum. However, the total number of extracted factors for any dataset cannot exceed the total number of variables in the dataset [see Jamal and Khan (2003)].

2.6. District Ranking Criteria

Using the weights generated by running Factor Analysis, we turn inequality indices into a composite index. A higher value of the index implies greater inequality of public service provision in that particular district and vice versa. This index should help us in identifying the regions, which require the Punjab Government's help most urgently and provides a sound basis for effective disbursement of limited development funds amongst the different districts of the province. This new approach for development funds disbursement can help reduce the prevailing levels of inequality by increasing access of public services for the masses.

3. RESULTS AND DISCUSSION

3.1. Health

We have divided access to health services into three sub-categories; child health, mother's health and access to overall health services. According to the available data, public services that can affect child health positively are, whether a child gets Vitamin A intake and Bacillus Calmette-Guérin **(**BCG) injections. Similarly, mother's health will be influenced by access to pre and post-natal care and the presence of a skilled attendant at birth[8]. The third measure is looking at overall access to any health facility. This third measure i.e. inequality of access to medical facility has turned out to be relatively higher for southern Punjab whereas the level of inequality in Lahore and adjacent areas is very low (see Table 3, Column 2). However, the three indicators of maternal health namely improved access to pre-natal care, post-natal care and assistance during the time of birth show relatively higher levels of inequality even in the districts where access to medical facility is very equitable (see Table 3, Column 5, 6 and 8). This result could mean that

[8]For this variable, improved access to pre-natal, post-natal and presence of a skilled attendant at birth implies that the individual used the services provided by a doctor, nurse or lady health worker (LHW) etc.

Table 3

either mothers' prefer not to access these services in case of pregnancy[9] or the staff at the health facility does not have the necessary skills and training to deal with maternal health issues.

Regarding child health, there is hardly any inequality, in terms of Vitamin A intake and most districts seem to have easy access to this service. But, BCG injections, used to prevent tuberculosis, exhibit huge variation across districts. The level of absolute inequality in access to this service is very high but there is no geographical pattern in terms of the lack of access.

We should mention the district of Gujrat specifically as it seems to have relatively easier access to general health and maternal health facilities, than even Lahore. One possible explanation for this phenomenon could be that the Chief Minister from the period of 2003–2008 belonged to the same district and may have been allocating provincial resources to gain political patronage.

3.2. Education

From the available data, we have estimated the inequality of access to schools at primary, elementary and secondary level. We separately consider access to elementary schooling for girls and boys and undertake a similar comparison for secondary level schooling. Access to primary education was analysed without differentiating between boys and girls. We did not make this distinction at the primary level because nearly all private schools enrol both girls and boys and so do some public schools. The results show very low levels of inequality in access to primary schools across all districts of Punjab.[10] However, access becomes more difficult at the elementary level for both boys and girls; districts such as Muzaffargarh, Rajanpur, Jhang and RahimYar Khan being the worse-off districts.[11] The inequality of access to elementary schooling is relatively lower for Lahore, Gujranwala, Gujrat, Sialkot and Rawalpindi. A similar geographical pattern is observed for access to secondary schools also.[12] It is worth mentioning that boys have greater access to elementary schooling than girls but the difference in access is considerably low.

3.3. Physical Infrastructure, Information and Others

Overall, access to solid waste collection and disposal seems to be a major problem across districts. Table 3 (Column 14) shows that the districts of Muzaffargarh, Rajanpur and Khushab have very unequal access to solid waste collection and disposal facilities. Furthermore, these districts also have unequal access to good fuel for cooking and these results evince that the population of these districts is highly vulnerable to health shocks.

The level of absolute inequality is extremely low for access to information (access to TV, phone etc.) and implies that most of the general population has easy access to media information through televisions and phones. This result means that the general populace is likely to be well-informed through these media sources, about the effectiveness of Government in responding to the needs of its people.

[9]In rural areas, it is common for pregnancies to take place at home, with the help of a traditional mid-wife.
[10]Refer to Table 3 (Column10).
[11]Refer to Table 3 (Column 11 and 12).
[12]Refer to Table 3 (Column 3 and Column 4).

The first column of Table 4 shows overall inequality in access to all social services. The district with greatest access to public services is given at the top. Districts such as Jhang, Bahawalnagar, Muzaffargarh and Rajanpur have extremely unequal access to public services whereas Lahore, Gujranwala, Gujrat and Rawalpindi districts have relatively easier access to public services.

Table 4

Overall Access to Public Goods

Districts	1 Composite Index	2 Health Index	3 Education Index	4 Information Index	5 Solid Waste Index	6 Others
Lahore	0.15	0.24	0.06	0.05	0.32	0.32
Gujranwala	0.20	0.25	0.06	0.08	0.68	0.46
Rawalpindi	0.22	0.28	0.14	0.06	0.62	0.36
Gujrat	0.23	0.22	0.17	0.06	0.86	0.41
Sialkot	0.26	0.33	0.12	0.08	0.79	0.59
Jhelum	0.28	0.28	0.24	0.08	0.82	0.48
Faisalabad	0.28	0.29	0.23	0.11	0.66	0.57
Chakwal	0.29	0.30	0.24	0.08	0.89	0.44
Narowal	0.31	0.28	0.23	0.09	0.87	0.75
Multan	0.32	0.43	0.26	0.17	0.54	0.48
Attock	0.32	0.43	0.21	0.11	0.86	0.50
Sheikhupura	0.33	0.31	0.28	0.12	0.80	0.64
Mandi Bahauddin	0.33	0.38	0.23	0.10	0.85	0.60
Sargodha	0.35	0.33	0.31	0.13	0.87	0.64
T. T. Singh	0.36	0.35	0.34	0.12	0.84	0.62
Hafizabad	0.36	0.32	0.37	0.13	0.86	0.66
Sahiwal	0.37	0.34	0.34	0.17	0.82	0.69
Nankana Sahib	0.38	0.34	0.36	0.13	0.85	0.78
Lodhran	0.39	0.38	0.38	0.17	0.79	0.70
Khanewal	0.40	0.36	0.39	0.19	0.86	0.71
Khushab	0.41	0.40	0.38	0.15	0.91	0.73
Kasur	0.41	0.39	0.39	0.17	0.84	0.78
Vehari	0.41	0.41	0.37	0.17	0.85	0.79
Okara	0.41	0.38	0.42	0.16	0.87	0.74
Mianwali	0.42	0.44	0.41	0.12	0.86	0.66
Bhakkar	0.42	0.43	0.40	0.18	0.89	0.71
R. Y. Khan	0.43	0.43	0.44	0.17	0.85	0.68
Pakpattan	0.43	0.46	0.37	0.18	0.88	0.82
D. G. Khan	0.43	0.44	0.42	0.22	0.91	0.70
Layyah	0.45	0.46	0.44	0.22	0.89	0.68
Bahawalpur	0.46	0.47	0.46	0.20	0.86	0.74
Bahawalnagar	0.46	0.48	0.46	0.20	0.85	0.71
Jhang	0.46	0.43	0.49	0.23	0.88	0.78
Muzaffargarh	0.47	0.43	0.51	0.23	0.71	0.78
Rajanpur	0.49	0.53	0.47	0.23	0.93	0.79

3.4. Distance from Lahore and Inequality in Access to Services

For all the social services discussed above, we look at how access to these services is linked to the distance from the capital of Punjab, Lahore. Lahore is the most developed city of the province and is home to many migrants from poorer districts. In Figure 1 to Figure 4, we have plotted the distance of a district from Lahore against the composite index of each social service.[13]

[13]The composite index for each social service is given in Table 4. The methodology for calculating the distance of each district from Lahore has been discussed in Section 2.4.

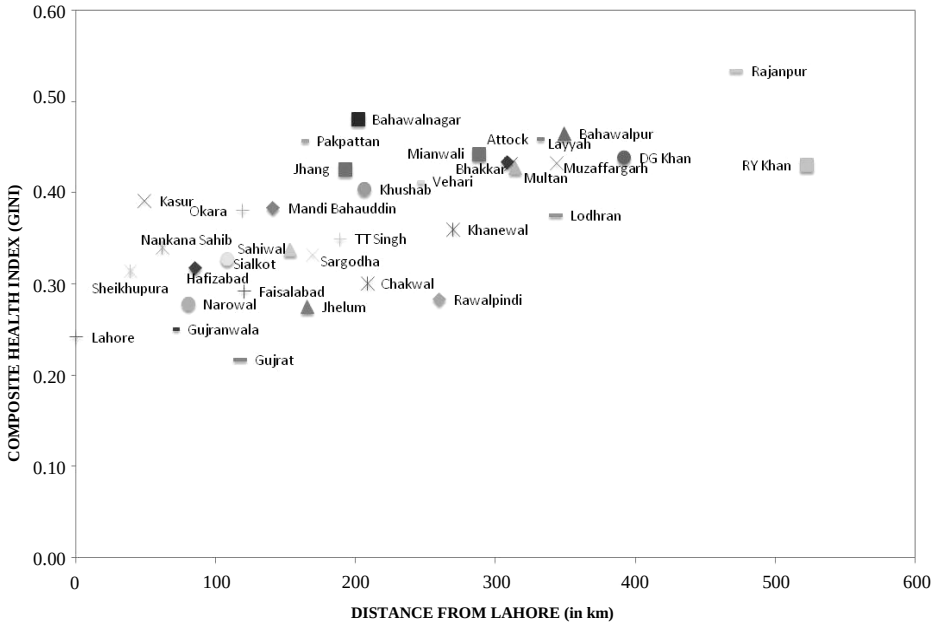

Fig. 1. Inequality in Access to Different Health Services (Index) vs. Distance from Lahore

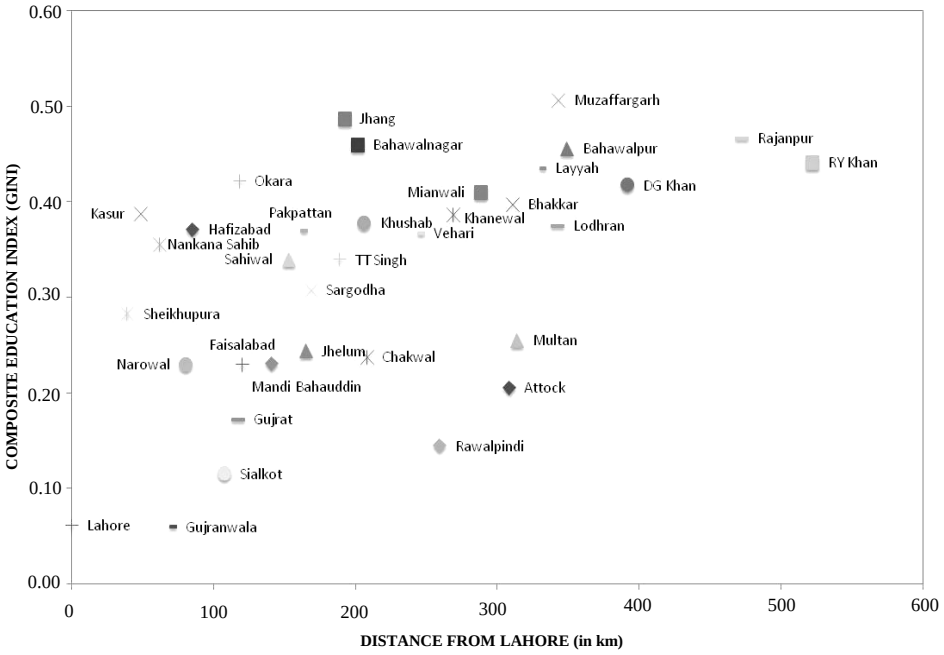

Fig. 2. Inequality in Access to Different Levels of Educational Institutions vs. Distance from Lahore

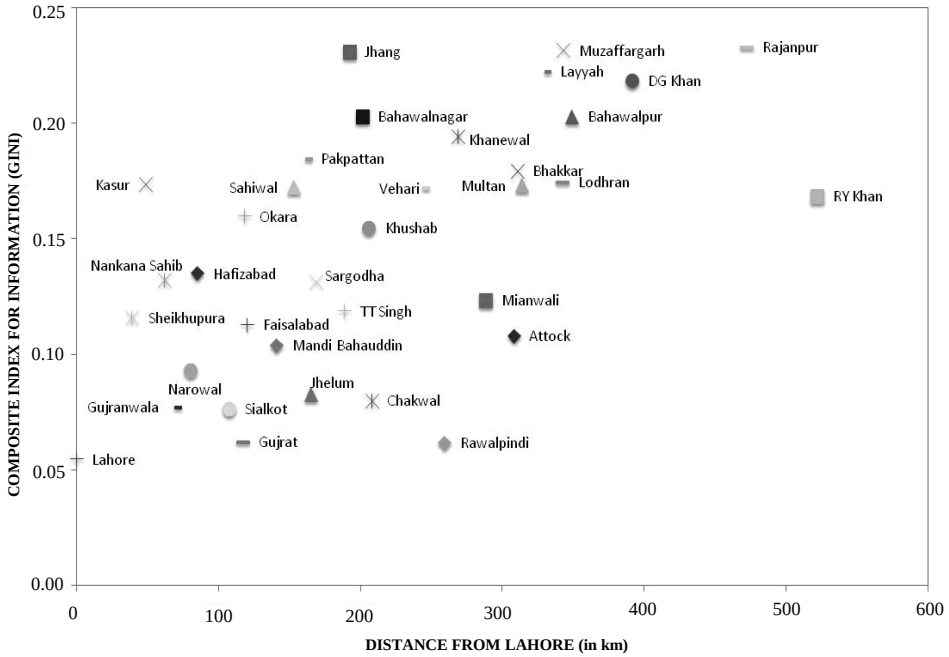

Fig. 3. Inequality in Access to Information (Media and Telephony) (Index) vs. Distance from Lahore

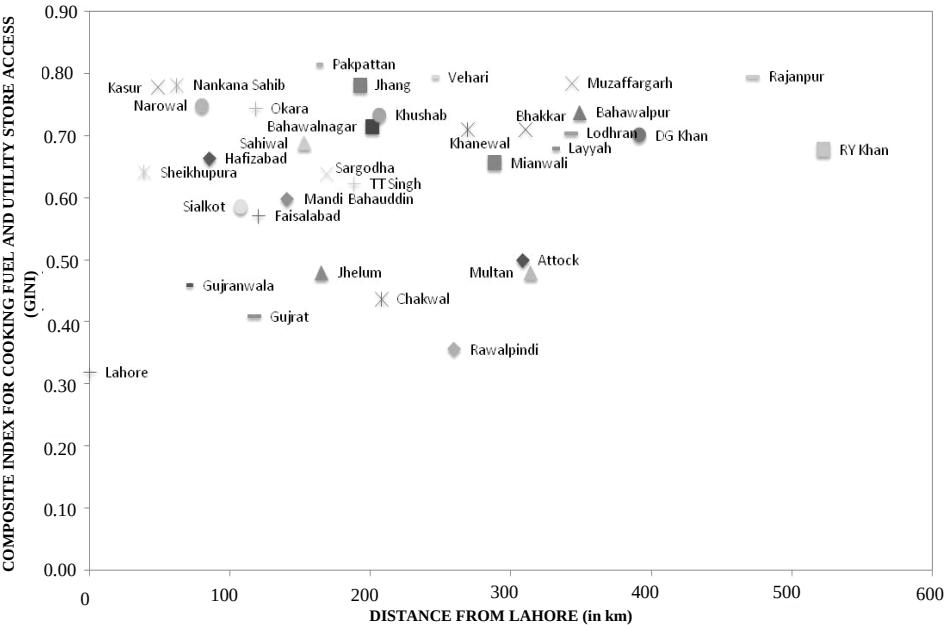

Fig. 4. Inequality in Access to Quality Cooking Fuel and Utility Stores (Index) vs. Distance from Lahore

The results demonstrate that as the distance of a district from Lahore increases, the composite inequality index for a district is likely to be higher. This shows that a district which is farther from the provincial capital is less likely to have access to basic services. In fact, most districts which are at a distance of more than 200 kilometers from Lahore rank very poorly in terms of the composite index for all services. DG Khan, RahimYar Khan, Bahawalpur, Rajanpur are amongst the poorest performing districts. This shows that resources and services are not being devolved effectively to poorer and backward areas and are concentrated at the core of the province, instead of the periphery.

3.5. Public-Private Partnership

Using the methodology discussed in Section 2.3, we will try to ascertain the contribution of the private sector in meeting the demand for social services. For Figure 5 to Figure 13, we compare the composite index for both public and private provision with the composite index for public provision only. The gap between the two reflects the contribution of the private sector for various social services across districts.

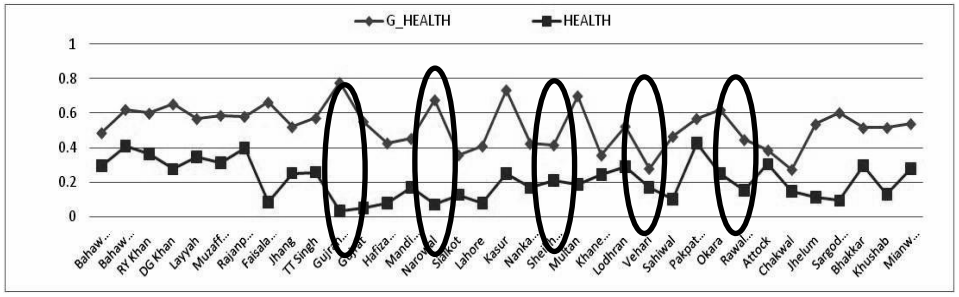

Fig. 5. Access to any Health Facility (both Public and Private) vs. Access to a Public Health Facility Only

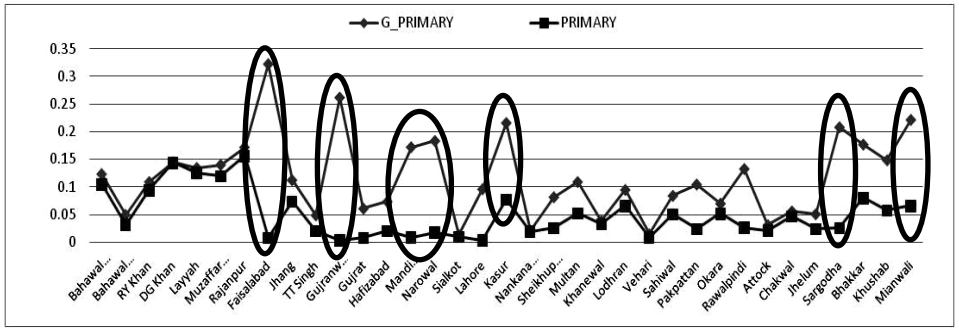

Fig. 6. Access to any Primary School (both Public and Private) vs. Access to a Public Primary School Only

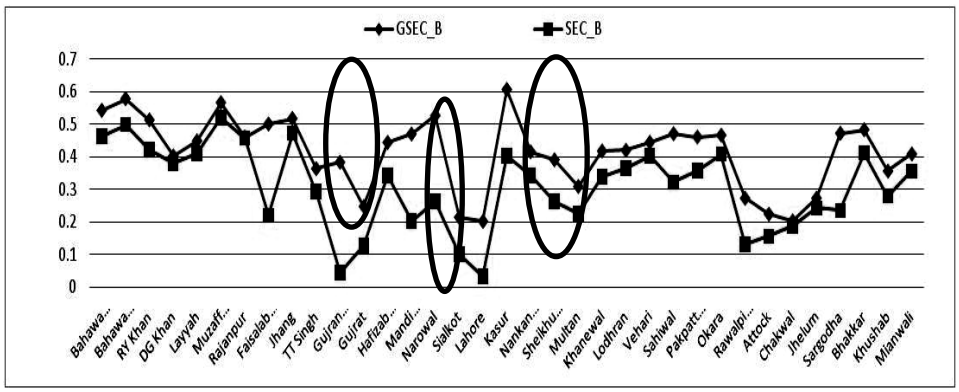

Fig. 7. Access to a Boy's Elementary School (both Public and Private) vs. Access to a Boy's Elementary Public School Only

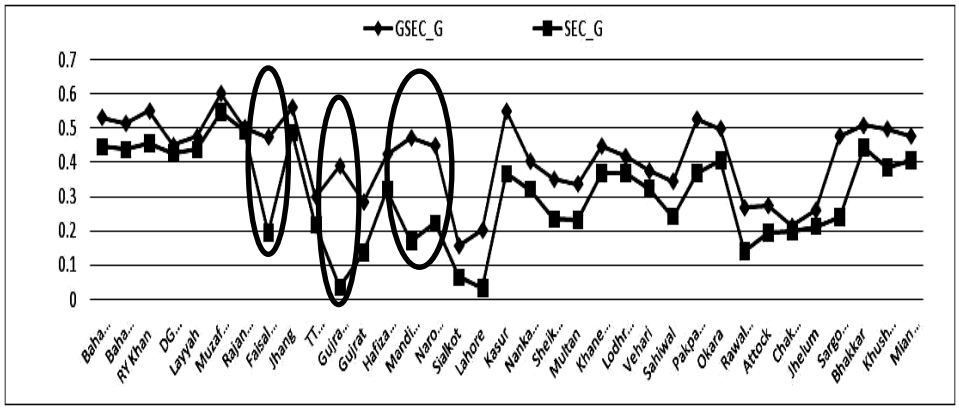

Fig. 8. Access to a Girls' Elementary School (both Public and Private) vs. Access to a Girls' Elementary Public School Only

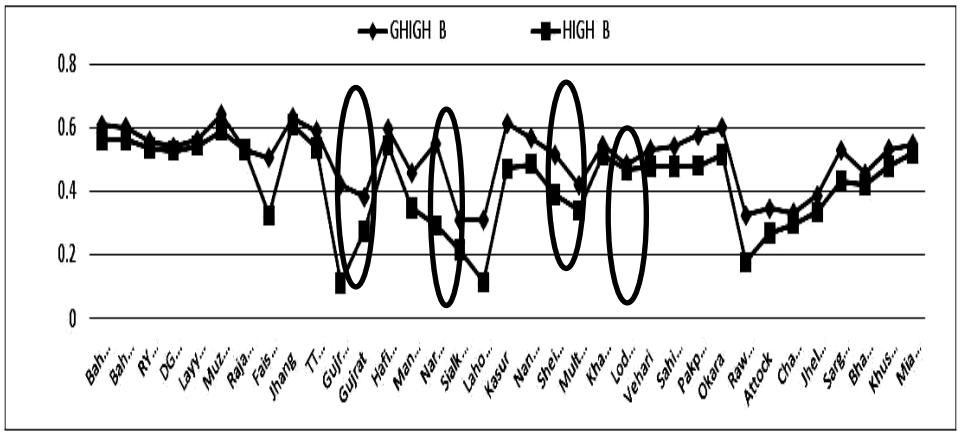

Figure 9. Access to a Boy's Secondary School (both Public and Private) vs. Access to a Boy's Public Secondary School

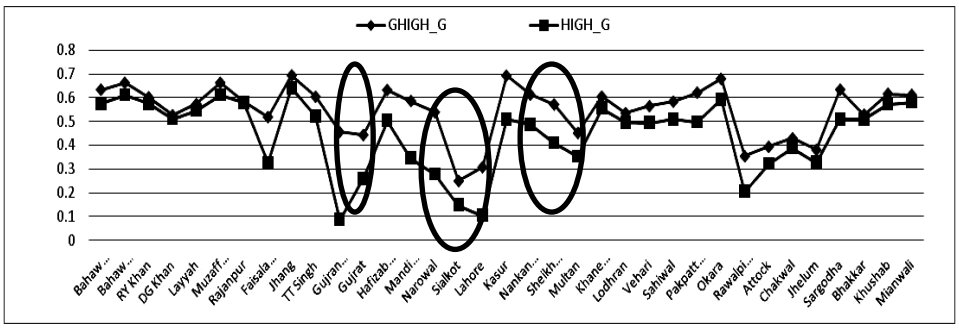

Fig. 10. Access to a Girls' Secondary School (both Public and Private) vs. Access to a Girls' Public Secondary School

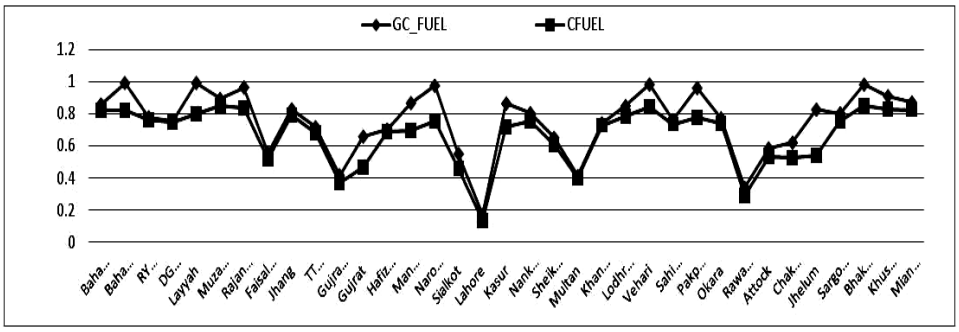

Fig. 11. Access to Fuel for Cooking vs. State Provided Fuel for Cooking

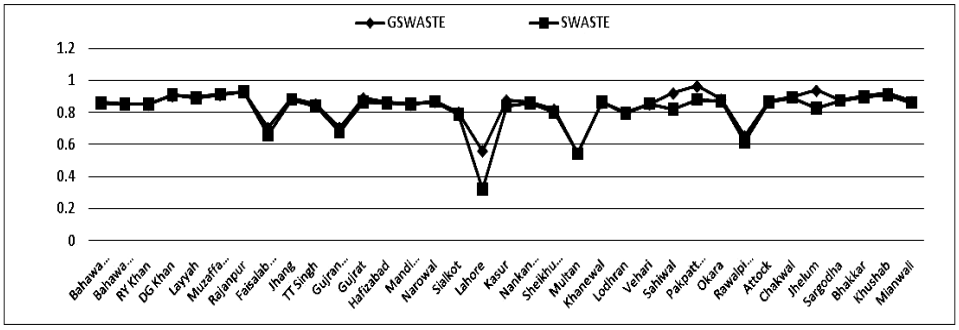

Fig. 12. Access to Solid Waste Collection and Disposal vs. State Provided Access

For instance, in Figure 5, we can clearly see that the inclusion of the private sector reduces inequality in access to health services considerably. The gap between the two indices is considerable for certain districts, especially Gujranwala, Sargodha and Faisalabad. Our results show that the private sector is making a notable contribution in reducing inequalities in access to health services.

From Figure 6 to Figure 10, we scrutinise the role of the private sector in overcoming inequalities in access to schooling for both boys and girls, at the elementary and secondary level. For primary schooling (Figure 6) the difference between the two indices is relatively less than Figure 5. Furthermore, for Figure 6, the level of absolute

inequality is significantly lower than that of health services. Even then, in some districts such as Faisalabad, Mianwali and Narowal the private sector plays a crucial role in providing primary education to both boys and girls. At the elementary and secondary level, overall access is limited and the private sector seems constrained in meeting the demand for secondary levels of education. However, there are cases where the private sector makes a significant contribution. For example, access to elementary schooling for girls is more widespread once private schools are considered for the districts of Gujranwala and Faisalabad.

4. CONCLUSION AND RECOMMENDATIONS

Lack of access to basic services such as health, education and physical infrastructure makes it unlikely for the poor to break away from a vicious poverty cycle. The poor lack access to these markets and are unable to occupationally diversify and protect themselves from exogenous shocks.

The current scenario clearly reflects that, as the distance of a district from the provincial capital increases, inequality in access to basic services increases. This result shows that resources are not being devolved effectively from the core to the periphery. The Punjab Government needs to develop a more holistic methodology for providing funds, where they are needed the most. Our research identifies the districts that have poor access to public services. Furthermore, we also ascertain the social service (health, education and, physical infrastructure) which is sub-optimally provided in a district. Therefore, the Government, not only knows which districts have poor access but also the social service which is provided inadequately.

The paper also acknowledges the role of the private sector in meeting the demand for some of these social services and identifies the districts where the private sector has been relatively successful. However, the role of the private sector is limited and the poor and destitute rely on the State to provide them with most of the social services discussed in this paper. To meet their needs, the State needs to ensure that scarce resources are allocated to districts which require them the most. Moreover for efficient coverage, the Government must provide the social service that is currently under-provided in that district. We have tried to develop a methodology, which will allow the Government to use its limited resources effectively in targeting currently poor and backward areas, which have limited access to basic services such as health, education and physical infrastructure.

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The State of Food Security in Pakistan: Future Challenges and Coping Strategies

MUNIR AHMAD and UMAR FAROOQ

1. INTRODUCTION

Pakistan is a low income developing country. Agriculture is the most important sector of the country meeting food and fibre requirements of the fast growing population. Although the rate of population increase has considerably slowed down from over 3 percent in 1980s to 2.09 percent in 2009-10, it is still considered high.[1] With the current rate of population growth, the population is expected to get doubled by 2050—making Pakistan 4th largest nation by 2050 from current status of 6th most populous state of the world [Pakistan (2010)].

The total cultivated area has increased by just 40 percent during past 60 years, while there has been more than 4 times increase in population with urban expansion of over seven-fold—resulting into mega-cities[2] as well as rising population pressure on cultivated land. Wheat production, a major food crop, has increased five-fold during the same period—yet the country is marginal importer of wheat. Tremendous efforts are needed both advances in technology and population control to narrow the food supply-demand gap.

Reducing poverty, hunger and food insecurity are essential part of MDGs[3] and are pre-requisites for economic development. Food security and economic growth mutually interact and reinforce each other in the development process [Timmer (2004)]. A country unable to produce the needed food and has no resources or afford to buy food from the international market to meet demand-supply gap, is not food sovereign state [Pinstrup-Andersen (2009)]. Food security is thus fundamental to national security, which is generally ignored [Fullbrook (2010)]. The extra-ordinary rise in food prices in later part of the first decade of 21st century raised an alarm bell on food security, particularly for

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[1]At the time of independence, Pakistan's population was only 32.5 million. It is around 170 million presently. Pakistan is still counted among the high fertility countries having a large proportion of young adults and children. The median age of population has increased from about 18 years in 1998 to 22 years in 2008.

[2]Currently, Pakistan is most urbanised nation in South Asia where 36 percent of country population is living in cities. The rate of urbanisation in Pakistan during 2005-2010 was 3 percent per annum. In 2005, more than half of the total urban population was living in urban areas of 8 big cities, i.e. Karachi, Lahore, Faisalabad, Rawalpindi, Multan, Hyderabad, Gujranwala and Peshawar. It is expected that by 2030, the rural-urban population ratio shall be 50:50 [Pakistan (2010)].

[3]MDG-1 calls for halving hunger and poverty by 2015 in relation to 1990.

the developing world. Pakistan is no exception. To achieve food-secure and pro-poor agricultural growth, Pakistan needs to adopt a comprehensive approach towards increasing productivity of all foods rather than merely concentrating upon achieving just wheat-based food security. Moreover, for benefiting from adoption of new agricultural technologies, the farm households should be able to finance expensive inputs and diversify their livelihoods through optimum farm and non-farm sectors' employment mix.

Managing food security in Pakistan also requires an understanding about its dimensions; future challenges of agricultural growth and food security; and impact of agricultural policies on food supply and income, the poor vulnerable in rural and urban areas; and what are do-able options. Thus, the main focus of this paper is to trace the pathways to achieve food and nutritional security for a growing population in Pakistan.

This paper is organised into seven sections. Section 2 discusses food security concept. Section 3 analyses food security situation in Pakistan in terms of food availability trends, its factors and nature of food security in the future. Section 4 critically evaluates Pakistan's food and other policies. Future challenges are discussed in Section 5. The ways forward are described in Section 6. Section 7 concludes the paper.

2. WHAT IS FOOD SECURITY?

Food security is the people's right to define their own policies and strategies for the sustainable production, distribution and consumption of food that guarantees the right to food for the entire population, on the basis of small and medium-sized production, respecting their own cultures and the diversity of peasant, fishing and indigenous forms of agricultural production, marketing and management of rural areas, in which women play a fundamental role.[4]

The history of food security dates back to the Universal Declaration of Human Rights in 1948 in which the right to food was recognised as a core element of standard of living and also to the world food crisis of 1972–1974. The food security concept continued developing overtime and approximately 200 definitions and 450 indicators are now available in the literature.[5]

The term "food security" refers the access to adequate amount of food for meeting dietary energy needs that implies for many as self-sufficiency as producing required food domestically [Pinstrup-Andersen (2009)]. A country is self-sufficient in food when it can manage the balance between supply and demand by producing domestically—no matter what the equilibrium price would be that could be beyond the reach of majority of the population in a developing economy.

The focus of national and global food security is generally on the supply side of the food equation—whether sufficient food is available [Pinstrup-Andersen (2009)].[6] The availability of food however cannot assure its access to the people. To ensure food security at the household or individual level, the access part needs to be addressed. This

[4]Final Declaration of World Forum on Food Sovereignty, 2001.

[5]Maxwell and Frankenberger (1992) listed 25 broadly defined indicators. Riely and Moock (1995) listed 73 indicators, somewhat more disaggregated than those mentioned in Maxwell and Frankenberger (1992). Chung, *et al.* (1997) note that even a simple indicator such as a dependency ratio can be used with many different permutations. They list some 450 indicators [Hoddinott (1999)].

[6]The term food is meant as dietary energy.

led the World Food Summit in 1996 to redefine the term as *'food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food to meet their dietary needs and food preferences for a healthy and active life'*. This definition encompasses five fundamental aspects: availability, access, stability, nutritional status and preferences of food. All of these components are influenced by physical, economic, political and other conditions within communities and even within households, and are often destabilised by shocks such as natural disasters and conflicts [UK Parliament (2006)].

The *availability and access* are two important dimensions of food security. The *availability* refers to sufficient quantities of quality/nutritious food available to every individuals in the country. However, even with sufficient availability of food at the country level, food availability is a serious concern in areas having armed conflicts, non-availability of arable lands, and existence of prolonged droughts—this is true for many areas in Pakistan. The distribution of food stuff in these areas is also faulty.

The *access* refers to the capacity to produce, buy and/or acquire appropriate nutritious food by the households and the individuals [Timmer (2000)]. Having access requires that sufficient food is consistently available in the market. But, the availability of sufficient food at country/local level does not guarantee that all people are food secure, since low incomes, lack of roads and infrastructure could deny access to desired quantities of quality food [UK Parliament (2006)]. Therefore, both availability and access parts of food security are inseparably inter-linked [Pinstrup-Andersen (2009)].

The access entails both physical access and economic access—the former refers to a place where food is available and the latter denotes 'entitlement' to food [Sen (1982)]. The former requires efficient market infrastructure to have access of people at low cost. The *entitlement* can be ensured either by own production or having food buying capacity or having access/right to other sources of getting desired food [Staaz, *et al*. (2009)]. Therefore, there is direct relationship between poverty and food insecurity since the very poor cannot take precautionary measures against food insecurity and thus, they would be the most vulnerable [Cullet (2003); Herrmann (2006)].

Stability refers to consistent supply of nutritious food at the national level as well as stability in access to food at the household and individuals levels. It is therefore directly affected by the performance of the agriculture sector. Only a small proportion of consumers in developing countries can afford to store food for the whole year. Therefore, besides production, stability requires better management of domestic production, food markets integration, and rational use of buffer stocks and trade [FAO (2002)].

Fluctuations/shortages in food grains production have been very common in Pakistan. At times, the government has to import significant quantities of food items to meet the shortages. In order to meet the shortages in deficit/urban areas and save consumers from high food prices, the government has been actively pursuing the policies of support/procurement prices, storage and distribution though at a very high cost. Therefore, market infrastructure has a much more role to play.

The definition of food security also alludes to '*safe and nutritious food'* that is required for an active and healthy life. For an active and healthy life, the human body has to effectively utilise the available nutrients in the food consumed [Staaz, *et al*. (2009)]. Biological food absorption is affected by food preparation and health condition of an individual—influenced by sanitation, clean drinking water, and knowledge of the

households regarding proper food storage, processing and basic nutrition.[7] Furthermore, the *preferences for food* add another dimension to food security that relate to the social and religious norms. People with equal access to food but having different food preferences based on religion, society norms, taste *etc* could demonstrate totally a different nature of food security. The foods are to be socially and culturally acceptable and consistent with religious and ethical values [Pinstrup-Andersen (2009)].

The above discussion wrapped around various dimensions of food security—availability, accessibility, stability, nutritional status and preferences, in general and in Pakistan in particular, highlights the fact that achieving food security is difficult, complex and challenging phenomenon. In view of the recent surges in food prices and policy shifts in response by various countries in panic further sparked off uncertainty that even led to the developed nations to think of "whether their own food security is in peril" [Fullbrook (2010), p. 5]. Moreover, the countries lacking food production potential and could afford to import their food needs started looking for chunk of agricultural lands across the borders to ensure uninterrupted food supply—overlooking a fundamental reality that when the locals of the host country are short of food who would guard the supply off to them? The considerations of the world are mainly confined to assuring steady supply of affordable nutritious food, but are missing the fundamental issue of 'security'—food is basically energy for humans without which "we are all dead" and thus should be viewed as a "security good" [Fullbrook (2010), p. 6].

3. FOOD SECURITY SITUATION IN PAKISTAN

3.1. Trends in Food Production, Availability and Food Security

Agricultural production is the foundation of food availability, especially for calories and proteins. Adequate food supply at affordable prices is the cornerstone of food security policy of all nations of the world including Pakistan. Pakistan has made significant progress in terms of increasing food supplies. Per capita availability of cereals increased from 120 kilograms in 1961 to 137 kilograms 1990-91 and further increased to 154 kilograms in 2008-9 [Ahmad, *et al.* (2010) and Table 1]; of which, more than 80 percent is accounted for by wheat alone. The government of Pakistan has tried to maintain per capita daily availability at the level of 2400 calories since early 1990s—that increased from 1754 calories in 1961 (Table 2). However, this daily average calories availability is substantially lower than the average of other developing and developed countries by 10 percent and 26 percent, respectively. The changes overtime in the composition of food intake show a shrinking share of wheat in total calories availability and a rising share of animals and other sources (Table 2). The share of wheat declined from 48 percent in 1990 to 38 percent in 2006, while the share of other cereals declined more prominently from 20 percent in 1970 to 6 percent in 2006. The share of livestock products in calorie intake increased from 12 percent in 1970 to 18 percent in 2002, which marginally declined to 15 percent in 2006. The share of other items—vegetable oil, vegetable, fruit and sweeteners, has substantially increased from 20 percent in 1970 to 37 percent in 2006.

[7]For example, in Hyderabad, contaminated water took 10 lives and 1000 people were hospitalised over the course of two months in 2004. Khan, *et al*. (2002) reported that 51 percent of the vegetable produce was unsuitable for human consumption due to excess chemical residues.

Table 1

Per Capita Availability of Food in Pakistan

Years	Per Capita Annual Availability (kg/person/annum)							Per Capita Daily Avail. (Grams)
	Food Grains	E.Oil/ Ghee	Meat	Milk	Fruits	Vegetable	Total	
1990-91	137.44	9.99	13.90	60.93	47.73	23.49	293.48	804.06
1991-92	144.18	13.07	14.38	62.26	48.30	27.70	309.90	849.03
1992-93	149.93	12.50	15.48	63.09	49.06	24.45	314.51	861.68
1993-94	158.80	10.50	16.07	64.60	53.65	27.20	330.82	906.35
1994-95	138.20	12.19	16.51	66.07	55.63	28.84	317.45	869.72
1995-96	148.55	11.42	17.25	67.16	56.23	27.03	327.64	897.64
1996-97	153.95	10.46	17.87	68.58	55.34	29.98	336.19	921.06
1997-98	161.07	11.59	14.00	81.45	56.48	31.11	355.70	974.53
1998-99	167.25	12.38	14.13	81.72	56.07	29.04	360.59	987.93
1999-00	158.83	11.08	14.19	82.15	52.23	24.55	343.03	939.80
2000-01	136.51	11.48	14.42	82.92	51.31	28.65	325.29	891.20
2001-02	135.53	10.67	14.50	83.45	51.29	25.35	320.78	878.85
2002-03	142.38	10.77	14.65	84.28	50.36	26.65	329.09	901.61
2003-04	143.83	11.16	14.74	84.42	47.82	28.23	330.20	904.66
2004-05	142.58	12.35	15.19	85.50	52.64	26.17	334.42	916.23
2005-06	140.98	12.75	16.33	90.30	51.25	31.18	342.79	939.14
2006-07	144.79	12.81	16.70	94.54	50.04	29.79	348.67	955.26
2007-08	155.04	13.29	17.00	93.93	53.71	31.23	364.20	997.79
2008-09	153.99	13.45	17.50	94.81	52.88	24.06	356.69	977.22

Source: Farooq, *et al*. (2009).

Table 2

Per Capita Availability of Calories and Shares of Various Sources

Year	Total		Wheat		Other Grains		Pulses		Animal		Others	
	Calories	%	Calories	%	Calories	%	Calories	%	Calories	%	Calories	%
1961	1754	100	742	42	342	19	114	6	260	15	296	17
1970	2203	100	984	45	438	20	77	3	257	12	447	20
1980	2124	100	967	46	304	14	49	2	261	12	543	26
1990	2410	100	1153	48	274	11	58	2	309	13	616	26
1995	2345	100	1048	45	212	9	59	3	353	15	673	29
2000	2447	100	1000	41	244	10	68	3	436	18	699	29
2001	2426	100	1000	41	256	11	58	2	436	18	676	28
2002	2419	100	999	41	275	11	59	2	437	18	649	27
2003	2320	100	945	41	108	5	61	3	322	14	886	37
2004	2231	100	897	40	107	5	62	3	321	14	844	38
2005	2271	100	914	40	108	5	63	3	325	14	861	38
2006	2423	100	930	38	110	6	65	3	330	15	888	37

Source: Ahmad, *et al.* (2010) (Table 5.7 updated).

Domestic production, net trade and food aid are the main constituents of food availability at the national level. Despite more than 3½ times increase in cereals and pulses production since early the 1960s, Pakistan has been importing significant quantities of wheat, pulses and edible oil to meet domestic needs. The share of imports in wheat consumption during the 1961-2006 has varied from 26 percent in 1961 to less than 1 percent in 2004 (Table 3). The huge food deficit during early 1960s largely reduced during 1970s as a result of Green Revolution technologies. The dependence on wheat imports however, re-emerged later because of stagnation in wheat productivity. In contrast, Pakistan has been successfully producing enough rice for domestic consumption and even its significant quantities are also exported [Ahmad, *et al.* (2010)].

Table 3

Food Balance-Sheet for Wheat (Quantity in '000' tones)

Year	Production	Imports	Stock Change	Exports	Total	Feed, Seed and others @ 10% of Production	Availability	Import Share
1961	3814	1080	–308	0	4586	385	4205	25.69
1970	7294	229	336	108	7751	729	7022	3.26
1980	10856	604	–1217	3	10240	1086	9154	6.60
1990	14316	2047	–691	2	15670	1432	14238	14.38
1995	17002	2500	–1399	0	18103	1700	16403	15.24
1996	16907	2500	–2539	0	16868	1691	15177	16.47
1997	16650	4088	–3487	0	17251	1665	15586	26.23
1998	18694	2023	–2181	0	18536	1869	16667	12.14
1999	17856	2006	–2061	0	17801	1786	16015	12.53
2000	21079	80	3045	80	24124	2108	22016	0.36
2007	23295	1820	–936	530	23649	2330	21320	8.54
2008	20959	3188	–1867	142	22138	2096	20042	15.91
2009	24033	0	5000	0	29033	2403	26630	0.00

Source: Ahmad, *et al.* (2010) (Table 5.8 updated).

One of the important indicators of economic access to food is the proportion of people below the poverty line [FAO (1998)]. The historical evidences show that: poverty increased during the 1960s despite rapid economic growth; it declined during 1970 through 1987-88 in spite of the growth being relatively slower; the declining poverty trends got reversed in 1990s albeit with reasonable rate of economic growth; and during 2000s poverty continued to rise in the face of uncertain economic growth. Nevertheless, the daily average availability of calories per person progressively increased over the last five decade—even though this availability has not been consistently reflected in declining poverty.

Despite significant improvement in aggregate food supply, malnutrition is a widespread phenomenon in Pakistan [Ahmad, *et al*. (2010)]. Rather, it has been argued that per capita food intake in the country has been higher than the recommended average at the national level [Khan (2003)]. Nevertheless, one third of all pregnant women were malnourished and over 25 percent babies had low birth weight in 2001-2. Malnutrition was a major problem responsible for more than 30 percent of all infant and child deaths in the country in 2001-02. The incidence of moderate to severe underweight, stunting, and wasting among children of less than 5 years of age was about 38 percent, 37 percent and 13 percent, respectively in 2001-02 [Planning Commission and UNICEF (2004)]. Malnourishment among mothers as reflected in body mass index was 21 percent in 2001-02 [Khan (2003)]. The overall undernourishment reported by FAO (2008) was about 24 percent in 2004, which is not only worst in South Asia after Bangladesh but this has been observed to be increasing over time. Micronutrient deficiency is pervasive in Pakistan, which is regarded as '*hidden hunger'* reflecting a combination of dietary deficiency, poor maternal health and nutrition, high burden of morbidity and low micronutrient content of the soil especially for iodine and zinc [Pakistan (2010)]. The deficiency in most of these micronutrients affects the immunity, growth and mental development and may underlie

the high burden of morbidity and mortality among women and children in Pakistan. This indicates that despite having sufficient food available at the national level, a large chunk of our population mostly the children and the women lack access to nutritiously balanced food.

The foregoing discussion highlights the fact that enhanced food security on its own cannot guarantee good nutrition status at the household level [Fullbrook (2010)]. Thus, greater national level food availability in Pakistan has not been translated into actual increase in calorie-rich food intake at the regional or household level reflecting reduced access to nutritious food. This could be due to worsening income and landholdings inequality in the country. A rising calorie-based poverty implies that most people had declining access to nutritious food. In addition, disparities in access to education and health may also be crucial. Therefore, simply emphasising on increasing food supplies cannot ensure food security. In such circumstances stable nutritious food supply and its distribution is considered to be critical issue [Pinstrup-Andersen (2009)].

3.2. Nature of Future Food Insecurity

In view of continuously rising population, the food demand in the country shall naturally increase. However, it is worth mentioning that future food demand would be different from today's because of the factors like: (a) increased proportion of older people due to age longevity; (b) greater urbanisation and emergence of big cities; (c) changes in family composition and structure; (d) changes in food consumption patterns and habits; (e) prevalence of diseases like Cardiac, Diabetic and Hepatitis etc. having special food requirements; and (f) rapid penetration of Super Markets and international Food Chains in developing countries. To target such diversions in food consumption in future, the major focus should be to incentivise the agricultural production to future needs. Thus, production system needs to be channelised towards higher production of fruit, vegetable and other high value commodities.

In Pakistan, about 68 percent of population earns their livelihood from agriculture sector to a varying extent. Livestock and crops sub-sectors contribute up to 28 percent and 24 percent towards rural households overall income, respectively. The non-farm enterprises, wages and services, remittances and other sources contribute 20 percent, 18 percent, 7 percent, and 3 percent, respectively. In rural Pakistan the economic access to food is mainly influenced by household level differences in land holding, education and employment. Decreasing size of land holdings besides inability of the economy to generate new employment limits productivity growth and rise in farm incomes.

Eeven though the food is predominantly produced in rural areas of Pakistan, yet a majority of the poor have lower economic access to food as compared to urban areas [World Bank (2008); Staatz, *et al*. (2009)]. Reliance on markets to obtain food for most of the food insecure people both in urban and rural areas is a common feature. The dependence of the urban poor on food markets is very well-known and documented, while the reliance of most of the rural food insecure among landless, marginal and small sized farmers' classes is rarely acknowledged [Staatz, *et al*. (2009)]. In addition to landless rural inhabitant (45 percent) more than 30 percent of the cultivators are net buyers of food staples—accounting 62 percent of the rural population who are either partially or totally dependent on market for food needs [Ahmad (2010)].

Unfortunately, the government efforts in providing relief to consumers and the subsidy involved in food staples are rarely meant for these rural households. Furthermore, the access to factors affecting the biological food absorption including sanitation, clean drinking water, and knowledge regarding proper food storage, processing, basic nutrition, and health facilities, infrastructure etc. is very poor in rural areas. The access to these indicators in food insecure rural areas is even overwhelming shocking. Therefore, improving market infrastructure, arranging safety net programs, provision of better education and health facilities could be the central elements of any strategy to reduce chronic food insecurity in both rural and urban areas in future.

4. FOOD SECURITY POLICIES AND THEIR IMPLICATIONS

It is generally believed that there are *two major policy failures* that lead to uncertainty in food security and increase in poverty in the developing countries including Pakistan. These policy failures include hasty withdrawal of state from the agriculture sector under the structural adjustment programs and paying no attention to setting up essential institutional infrastructure to exploit farm-nonfarm sectors' nexus. This chaotic move resulted into reduced investment in research and development not only by the national governments of the developing countries but international donor agencies also withdrew their support [Zezza, *et al*. (2007)]. As a result of non realisation of intrinsically interlinked sectors and simultaneous policy moves—retreating from support without providing alternative pathways, agricultural productivity declined and incidence of rural poverty increased leading to greater reduction in access to food. That perpetuated further into poverty-food insecurity helix. Pakistan never had any national food policy except launching a few food security programs at the regional levels [Mittal and Sethi (2009)].

Social protection covers both the safety nets and social security programs. World Bank[8] in its recent publication has classified the total spending on social protection in Pakistan in two broad groups: (i) safety nets which include cash transfers, social welfare services, human capital accumulation and wheat subsidies; and (ii) social security comprising public sector spending on civil services pensions, and private sector sponsored welfare fund and cost of employees social security institutions. Asian Development Bank[9] decomposed the social protection spending in Pakistan into the following categories: (i) labour market programmes; (ii) social insurance programmes; (iii) social assistance and welfare programmes; (iv) micro and area based schemes (community based); and (v) child protection programmes. Detailed discussion regarding these programs is beyond the scope of this paper. However, we would touch upon briefly the safety nets in Pakistan.

Pakistan has a number of safety nets programmes implemented by various Ministries. The main two cash transfer programmes are: (i) Pakistan Bait-ul-Mal[10] working

[8]Social Protection in Pakistan: Managing Household Risks and Vulnerability. World Bank, October 2007.

[9]Scaling Up of the Social Protection Index for Committed Poverty Reduction. Final Report. Volume 1. Multi Country Report, Halcrow China Limited. Prepared for Asian Development Bank, November 2007.

[10]Pakistan Bait-ul-Mal (PBM) disburses to the destitute, needy, widows, orphans, invalids and infirm irrespective of their gender, caste, greed or race. PBM provide assistance under different programs and schemes, such as Food Support Programme (FSP) carrying major share followed by Individual Financial Assistance (IFA), International Rehabilitation through civil society wing, National Center for Rehabilitation of Child Labour (NCRCL), Vocational Training Institutes/Dastkari Schools (VTIs) [Pakistan (2010)].

under the Ministry of Social Welfare and Special Education;[11] and (ii) *Zakat*[12] and Usher schemes administered by the Ministry of Religious Affairs[13] [Pakistan (2010a, b]. Other programmes including school feeding, safe motherhood and child nutrition, etc are providing assistance to about 2 million households. These programmes are being implemented by the provincial education and health departments with the assistance of WFP, WHO, UNICEF and UNESCO. Recently, Government has introduced Benazir Income Support Programme (BISP) to cater the needs of the "poorest of the poor" sections of the society. Under this program, Rs 46 billion rupees were disbursed in 2009-10, while Rs 50 billion is allocated under this scheme for the year 2010-11 [Pakistan (2010b)].

The above mentioned cash transfer programmes follow different modalities for identification of beneficiaries, targeting mechanism, coverage and outreach, due diligence and monitoring mechanism. A number of issues worth noting in these programs include: (i) most programmes are fragmented, duplicative and disjoint with no coordination mechanism; (ii) they are thinly spread and have poor coverage, and often exclude marginal and people in remote areas; (iii) at present, the main criterion used for identification of recipients is poverty which exclude transitory poverty and vulnerable shocks particularly people having low human capital and access to productive assets; (iv) absence of standardised eligibility criteria (operational definition) and lack of transparency in identification ultimately leading to inclusion of ineligible and exclusion of needy and deserving one; (v) the payments are small as they represent 10 percent to 20 percent of the consumption need of the household; (vi) the disbursements are irregular and lumpy; and (vii) the annual payments are not adjusted for inflation or cost of living [FAO (2008)].

On the supply side, various agricultural projects have been undertaken by the government of Pakistan resulting into a significant increase in the productivity of food crops. These programs include development of irrigation, roads, market infrastructure, and investment in agricultural research and extension. The empirical studies has shown that investment in research and development has paid off in terms of increasing agricultural productivity, raising family earning, nutrition which in turn supported rise in labour productivity, and better health and well being of people. Keeping in view the importance of agriculture and ensuring food security on sustainable basis, the government of Pakistan started a Special Program for Food Security (SPFS) with major support from FAO. The SPFS project was piloted initially in three villages including two sites in Punjab and one in Khyber Pakhtunkhwa with twin objectives: (1) to ensure the adequacy and access to food supply; and (2) to maintain the stability in agricultural production. The major focus of this program was on enhancing agricultural productivity and profitability of the major food crops—wheat, rice, maize and oilseeds, on a sustainable basis. The

[11]In July-March period, Pakistan incurred Rs 2.7 billion to 1.438 million beneficiaries in 2008-09, Rs 1.65 billion to 1.11 million beneficiaries in 2009-10 financial year and allocated Rs 2 billion for 2010-11 [Pakistan (2010a,b)].

[12]Zakat provides financial assistance such as *Guzara* allowance, educational stipends, health care, social welfare/rehabilitation, Eid grans and marriage assistance through regular and other *Zakat* programmes and national level schemes [Pakistan (2010)].

[13]In July-March period, Pakistan disbursed Rs 1.421 million to 0.538 million beneficiaries during 2008-09, Rs 0.404 million to 0.538 million beneficiaries in 2009-10 financial year. More than half of the *Zakat* fund is disbursed through regular *Zakat* programmes [Pakistan (2010a,b)].

project was first up scaled to 109 villages in May 2002 under the name of Crop Maximisation Program (CMP-I) and then extended to 1012 villages all over Pakistan in 2008 (called CMP-II), totally sponsored by the Government of Pakistan. The results of the SPFS were encouraging at two sites in Punjab on the basis of which 109 villages brought under this net in the name of CMP-I. The performance of CMP-I was dismal [Ahmad and Iqbal (2006)]. Despite that the CMP-II was initiated in 1012 villages in Pakistan with a target to extend it to 13000 villages. The success of this program is also being seriously questioned by the stakeholders and professionals.

The major focus of Pakistan's food security has remained on supply side that mainly revolved around maintaining wheat self-sufficiency only. The production and marketing of other food crops is left on market forces. Government procures and maintains operational as strategic reserves of wheat and resells through flour mills after covering the cost of storage, handling, and other incidentals. The annual cost of subsidising wheat is massive as the leakages in procurement system, storage and the milling sector have significant hidden costs. Given these leakages, the benefits accrued to intended beneficiaries do not commensurate with the subsidy involved. Other food related subsidies were also provided for addressing the food security of poor urban sections of the society include food items sold through Utility Stores Corporation (USC) at subsidised prices. Rs 36.9 billions were spent on various food related subsidies in 2009-10, while Rs 27.044 billions are allocated for the current fiscal year [Pakistan (2010c)].

Ahmad, *et al.* (2006) evaluated various seasonal phases of wheat marketing over the period 1996-97 to 1999-2000. Using partial equilibrium analysis[14] the study showed that total producer welfare loss was Rs 37.96 billion including policy cost to government amounted to Rs 11.05 billion. The overall financial loss was about Rs 3.37 billion, reflecting mainly the difference between gain to the millers, and the subsidy provided by the government—a gap apparently unaccounted for in the system. The study also highlights the fact that the consumers are subsidised at the expense of the farmers, and the millers absorb almost all the subsidy provided by the government to implement wheat policy.

Ahmad, *et al.* (2010) concluded that marketing costs incurred by government-owned departments are significantly higher than that of incurred by the private traders. Corruption is pervasive in commodity marketing, particularly in the public sector. Rent-seeking activities increase transaction costs and uncertainty, discourage marketing investment and participation—ultimately leading to negative fiscal impact for the government.

To supplement the above conclusions, we analyse the current government intervention in food marketing where government tried to achieve wheat self-sufficiency in 2008-09. The support price for wheat was raised from Rs 650/40-kg to Rs 950/40-kg besides providing heavy subsidy on fertiliser. As a result, Pakistan has been enjoying self-sufficiency in wheat for the last two years. The country also has a history of

[14]They analysed quantities—production, home consumption, feed, seed, and wastage; government procurement and open market sales; imports and marketed consumption; prices—government support, issue price, wholesale price, import parity price, government's import price; and costs—government storage cost and private storage cost.

carrying-over high wheat stocks: 3.552 million tons in 2000-01; 3.683 million tons in 2001-02; and 4.223 million tons during 2009-10 while procured another 6 million tons slot from 2009-10 wheat crop—resulting into a stock of 10 million tons with the public stores. Historically, the government of Pakistan has been releasing wheat on average more than 5 million tons of annually from its stocks. This indicates that the carryover stock for 2010-11 shall be more than 5 million tones.

Managing nearly half of national wheat production procured by the government heavily costs to the national exchequer (about Rs 30 Billion per annum). Government borrowing for maintaining wheat reserves accounts more than Rs 414 billion—Punjab and PASSCO are major credit takers. What monetary damage has been done due to this poor food stocks management policy is a question which an ordinary student of development studies can ask. A simple comparison of the value of wheat lying in public sector stores and the amount of bank loans shows that the credit amount is much higher than the value of wheat stored, i.e., total value of wheat is equal to Rs 262.5 billion *vis-à-vis* bank loan of Rs 414 billion. It means the provincial and federal governments would not be able to pay the loan from the stored wheat even if they export its each and every grain (Table 4).

Table 4

Policy Decision Regarding Export of Wheat from Pakistan 2010-11

Items	Punjab	Sindh
Wheat procurement price paid by the government (Rs/40-kg)	950	950
Incidental charges (Rs/40-kg)	70	70
Annual wheat storage charges paid by the government (Rs/40-kg) (Based on Rs 2 billion per month for storing 10 million tons of wheat)	250	250
Wheat cost at PASSCO/Provincial Food Department's Stores (Rs/40kg)	1270	1270
Export parity price at Karachi in f.o.b. terms (Rs/40-kg or Rs/ton)	1070 (26750)	1170 (25500)
Government release price for export purposes (Rs/40-kg or Rs/ton)	1000 (25000)	1000 (25000)
Loss to the government at release price (Rs/40-kg or Rs/ton)	270 (6750)	270 (6750)
Loss to national exchequer by allowing export of 1 million ton (Rs)	6.75 Billion	6.75 Billion
Loss to Punjab government by allowing export of 3.5 million ton (Rs)	23.625 Billion	Not Applicable
Total value of wheat lying in government stores at its release price (Rs)	262.5 Billion	
Total amount of credit payable by provinces, PASSCO and TCP (Rs)	414 Billion	
Total government earning by exporting 3.5 million ton (Rs)	75 Billion	

Note: Figures in parentheses are on per ton basis.

The above discussion clearly indicates the following major flaws in the existing wheat policies: (a) producers hardly benefit from these policies both in terms of sustainable increase in production and better marketing opportunities; (b) benefits to consumers were also partial, as the major chunk of benefit goes into the pockets of the flour millers; (c) serious distortions in wheat and wheat flour prices through undue government interventions in terms of un-targeted subsidies; (d) considerable inefficiencies in managing wheat surpluses as the quantities procured were beyond the storage capacities available with the government departments—hiring private storage facilities at a huge cost to the nation; (e) exchequer being additionally burdened by

providing highly subsidised wheat flour to the public and schemes like "cheap bread"; (f) generated massive inefficiency in flour milling sector; and (g) target population is generally not effectively being dealt with and in particular the rural poor lack access to most of the safety nets.

5. FUTURE CHALLENGES

As discussed above, both supply- and demand-side issues of food security need to be addressed to achieve sustainable food security. Pakistan has enormous potential to further develop its agriculture sector upon which about 2/3rd of population is directly or indirectly depends for their livelihood. However, Pakistan economy is experiencing structural transformations and the role agriculture in economic development is changing fast—its share in national GDP is declining faster than proportion of labour seeking livelihood from this sector, and a very small proportion of farms experiencing fast modernisation, while majority of the farmers are resource poor and operate in low-input, low-output scenario. Therefore, Pakistan has to adapt three-prong strategy—developing farm and non-farm sectors as well as reducing polarisation within agriculture sector either by helping the inefficient farmer to approach the frontier or helping them to finding alternative livelihood in the non-farm sector. However, in this section we shall mainly discuss the production side challenges.

At current rate of population growth, Pakistan needs to increase substantial food production to feed a growing population with some modest surpluses for export. Substantial increase in crop productivity has to be targeted using lesser land and water resources than are available for agriculture today. One is not sure of achieving individual milestones in the fast changing dynamic world, but one thing is to be believed that agriculture must maintain a growth rate of more than 5 percent in order to ensure a rapid growth of national income, attaining macroeconomic stability, effective employment of growing labour force, securing improvement in distributive justice and a reduction in rural poverty in Pakistan.

> *"Food security is possible well into the future. Science provides the tools, agricultural research the modality, intellectual insight the design of the next revolutions that will help smallholder farmers improve their square yard of earth, and help the world to keep pace with population growth"*(Austin, undated).

5.1. Sources of Growth in Agriculture

Three major factors that influence the supply side of food include: (1) the higher use of conventional inputs;[15] (2) increase in total factor productivity (TFP);[16] and (3) the targeted transformations in the institutional setup that assist the agriculture sector. These sources of growth are interrelated and the contribution of one is dependent on the effectiveness of the other.

Higher Use of Inputs and Farm Size: Two major *inputs* in agriculture are land and water. The prospects of allocating more of these vital inputs are limited. Rather, both land

[15]This pertains to the economies of size and indicates the movement of the producer along the best practice production frontier.

[16]That refers to shifting of the production frontier upwards by R&D efforts.

and water resources are facing declining trend in supply caused by land degradation[17] and fast expansion of cities. The chances for bringing unused or marginal lands under cultivation are also meager because the quality of such lands is poor and the investment to increase productivity in these lands may be uneconomical and unsustainable [Fullbrook (2010)]. The intensive use of land (cropping intensity) is another source of increasing agricultural output that too has reached even in the vicinity of 200 percent in certain irrigated areas indicating no chance of going beyond that. Similarly, the use of inputs like *fertilisers and pesticides* cannot be increased beyond certain limits because of national health and environmental concerns. Furthermore, due to increasing prices of fertiliser, energy and declining water availability the already declining rate of growth in use of chemicals has turned into negative in recent years. However, alternative sources of nutrients need to be explored and popularised. The use of biocides is observed to be declining in a number of countries and a few of them are even returning to organic farming.

The other inputs include *farm machinery*—tube-wells, tractors and implements, the supply of which once increased significantly is now facing the declining rate of change in growth. The available farm machinery is more suited to large farms, and thus the farm machinery research has to be redirected to explore and improvise mechanisation suited to small farmers (i.e. reverse mechanisation favouring small farmers). The machines required for harvesting and post-harvest handling and small scale value addition are yet to be developed and popularised.

As regards the *farm size***,** Pakistan has a highly skewed distribution of farm lands.[18] Basically the ownership of this major factor of production determines the access to input and output markets. Therefore, the benefits of agricultural development are also shared rather more unequally. The poor small farmers use 30 percent to 50 percent less of various factors of production than the use at rich farmers—leading to lower land productivity, greater poverty and food insecurity. All inputs combined have been contributing towards agricultural output growth ranging from 25 percent-50 percent during 1990s in Punjab [see Ahmad (2003); and Ali and Byerlee (2000)]. Thus in future, there are only limited chances of inputs intensification and increasing the agricultural output—approaching upper bound through these resources.

Increase in Total Factor Productivity (TFP): TFP refers to shifting of the production frontier upwards in case of progress, and downwards as a result of regress. Research and development (R&D) efforts, flow of information, better infrastructure, availability of funds and farmers' managerial capabilities are the prime movers of TFP. Empirical studies show that the TFP estimates differ widely and range from 0.37 percent to 2.3 percent dominating the share of TFP in output growth. The studies have also shown the signs of declining TFP growth because of deteriorating land and water resources [Ahmad (2003); Ali and Byerlee (2000)]. There is strong empirical evidence

[17]Because of poor response towards inputs applied in such lands, the farmers use lower doses of inputs as compared to normal healthy lands. Reduced levels of inputs use on such lands vary from 12 percent to 80 percent, and as a result from slight to moderately affected patchy lands agricultural output declined by more than 30 percent [see Ahmad (2003)].

[18]In 2000, about 58 percent of total farmer had less than 5 acres land and operating only 16 percent of total available cultivated area In contrast, only 6 percent farms having more than 25 acres of land were operating 32 percent of the total cultivated area. The situation in some provinces is rather more serious.

that high levels of research and development (R&D) investments lead to high productivity and eventually to increased economic performance. A strong relationship between agricultural output and outlays on agricultural research and extension exists in Pakistan—about 32 percent rate of returns on such investment has been observed [Khan and Akbari (1986)]. Another recent study by Kiani, *et al*. (2008) found that investment in agricultural research resulted in attractive returns in Pakistan ranging from 49-78 percent—highest returns of 57-88 percent in Punjab province followed by that in Sindh (24-48 percent). While R&D activities are important, these must be supported by favourable policy instruments, human resource development, necessary physical and institutional infrastructure etc.

> *"No country has been able to sustain a rapid transition out of poverty without raising productivity in its agriculture sector"* Timmer (2005).

Targeted Transformations and Institutional Setup Assisting the Agriculture Sector: The third major factor contributing towards agricultural growth is the policy targeted institutional reforms including agricultural extension, education and credit, and improvement in the functioning of input and output markets [Saris (2001)]. The existing institutions have further deteriorated the disparity between the rich/large and the poor/small farmers in rural Pakistan by offering greater access to influential and well-off farmers. Moreover, the agricultural price policies in Pakistan remained anti-producers and tended to slow down the growth. Under the Structural Adjustment and Stabilisation Programmes (SAP) the government of Pakistan removed all the input subsidies during the 1990s resulting into many fold increase in input prices and thus greater cost of production—squeezing the profitability of the a sector in general and of poor farmers in particular. While implementing the directives from IFIs the state's role was quickly reduced/withdrawn without redirecting enhanced public sector focus on rural development to neutralise the policy effects on agriculture. The negative effects became more pronounced when the private sector investments lagged behind as well.

5.2. Constraints

The major hurdle to develop the agriculture sector of Pakistan in general and food grains production in particular is the lack of holistic policy approach—intervening in one or more commodities leaving others on the behest of market forces used to result in frequent supply and demand imbalances in other commodities. Efforts in correcting these divergences turned often bad for the others. Such partial policy dynamics reduced the process of commercialisation and specialisation in agriculture and also decelerated the growth in agricultural productivity, particularly in food grains. The analysis of a recently published study by Falkenmark, Rockström and Karlberg (2009) presents a very bleak picture for Pakistan in terms of water shortage and potential of increasing food production through area expansion by 2050. In terms of area, very low potential left since most arable land is already in use, while freshwater will be the most fundamental constraint in food production in coming decades—Pakistan is shown in dark brown in Figure 1. The study further concludes that Pakistan is among those countries that are *"approaching the end of the road unless income growth in the meantime allows them to import the food required"* (p. 65).

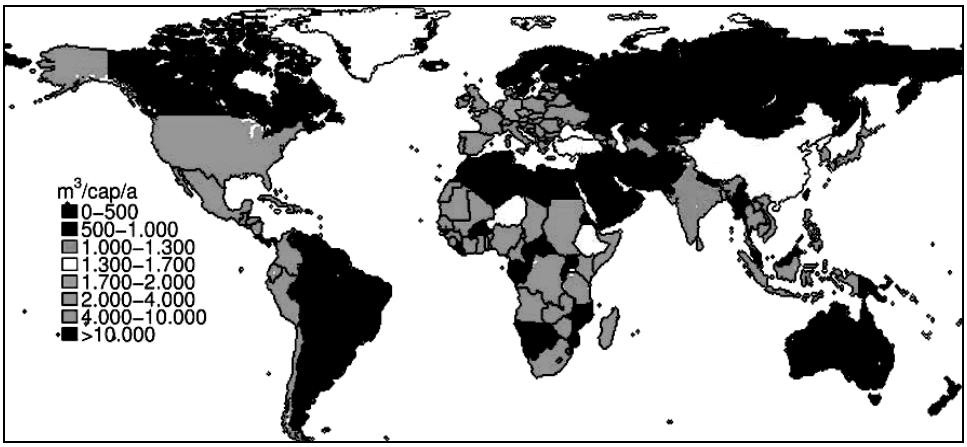

Fig. 1.

Figure 1 Countries colour coded according to water availability for food self-sufficiency. Those with <1,300 m3/capita/year are in deficit. Details can be seen from Rockström, *et al*. (2008) cities in Falkenmark, etc. (2009).

Other factors influencing the food security in Pakistan are the outcomes of both partial policies and the neglect of R&D activities including: (a) fluctuating food grains production—generally below the domestic requirements; (b) the slow pace of varietal development in pulses, oilseeds and fodder crops with non-existence of seed marketing system for these crop groups; (c) the almost dependence of vegetables sector on imported seed; (d) poor marketing infrastructure unable to insure timely availability of quality inputs;[19] (e) low genetic potential of available varieties and slow varietal replacement because of unaffordable high prices of certified seed; (f) presence of serious governance issues in food procurement, marketing and distribution system; and, (g) inability of poor farmers to respond to food price hikes due to simultaneous rise in input prices and having no or very small marketable surplus available with them on output side to finance to.[20]

6. WAY FORWARD

"*A precautionary approach would put food first because if it is not secure, even sovereign, then the security of society is put at risk. Putting food first, will require the reordering of priorities and recognition of the fundamental value of food in securing life and supporting society. As food secures life and the mission of*

[19]Major area of wheat now falls in rotation of various *kharif* crops like cotton, rice, sugarcane. A period of 1-4 weeks is available to the farmers between harvesting *kharif* crops and wheat planting. During this period farmer is pretty busy in disposing off previous crops as well as struggling for procuring inputs for wheat while market intermediaries (commission agents) do not clear their accounts on previous crops or delay the payments of their sale proceeds. Shortages in the availability of inputs like seed and phosphatic fertiliser finally converge at using low quality and levels of these vital inputs.

[20]Most of the food marketable surplus is generated by medium and large farmers. This is because 58 percent of farming population operates <5 acres of land and they are cultivating only 18 percent of total cultivated area. The farmers having 5 to 12.5 acres represent 28 percent of farming population and operate 30 percent of total cultivated area. In this way, farmers operating <12.5 acres represent 86 percent farmers and are cultivating 48 percent of total cultivated area in the country.

> *national security is to secure society and defend its existence, it follows that food forms an intrinsic element of national security but one that is generally overlooked……Putting food first will strengthen the security in food security, thereby contributing to the comprehensive, sustainable security and well-being of citizens and society"* [Fullbrook (2010), p. 7].

The major hindrance in achieving food security in developing countries including Pakistan is the high levels of poverty, and thus poverty reduction is a most powerful tool to improve food security that can be achieved through equitable economic growth [Smith, *et al.* (2000)]. Smith, *et al.* (2000) further suggests various ways to achieve pro-poor growth: (1) by enabling the poor to participate in the growth process and increasing their access financial and productive resources and providing them physical and market infrastructure; (2) investing in human capital of the poor—provision of health and education that enables them to take advantage of new opportunities; and, (3) investing in the social capital of the poor—network, norms, and trust among members of communities that help coordinate and cooperate for members' mutual benefit in the community [Moser (1996)]. In Pakistan most of the poor live in rural areas and are directly and/or indirectly dependent on the performance of agriculture sector. Besides improving food security of urban population, food security of rural households can be improved by increasing agricultural productivity.

For increasing agricultural productivity, a number of services and support institutions need to be either strengthened or to be created including developing IPRs (Intellectual Property Rights) for promoting R&D in private sector. The goals and priorities of the research have to be reformed both at the federal and provincial levels. An infrastructure of experiment stations in various ecological zones in partnership with the progressive farmers (small, medium and large, to evaluate the adaptability/applicability of the innovations under local conditions) need to be developed. Also, the same stations should be used as hub of trainings of extension people and farmers. The focus of commodity research needs to be shifted to system perspectives in order to enhance research impacts and income of the farming community.

Research policies have to be focused on cropping zones and their development to increase systems profitability. No egalitarian approach of one-size-fits-all shall apply. Basic and applied research including social sciences has to be focused on cropping systems/zones, since the zones are heterogeneous in socioeconomic, resource endowments and agronomic characteristics and the issues/problems differ significantly from each other. Moreover, the focus of commodity research needs to be shifted to system perspectives in order to enhance research impacts and income of the farming communities. In order to effectively implement this strategy, we have to reassess human resource requirements, research and extension infrastructure, and more importantly the academic curricula in the universities.

New programme interventions particularly in remote areas for training technicians in agriculture and non-agriculture enterprises also need to be initiated. Trained technicians can bring revolution in agriculture as well as in non-agriculture sectors. This is expected to increase access to food and help reduce food insecurity. In addition to human development, a well organised food assistance program in food insecure and low agricultural potential areas would enormously help reduce poverty and enhance access to food [Smith, *et al.* (2000)].

For all this to happen, the federal and provincial Ministries have to redefine their boundaries since these issues are provincial subject. The policy-makers need to think and establish system perspectives linking agriculture and non-agriculture sectors. This requires a close cooperation in policy, program formulation and implementation between Agriculture and other Ministries to foster rural and agriculture development in general and food sector in particular. For example, for proper programme planning, formulation and implementation the Ministries of agriculture, local government, water and power, labour and manpower, commerce and industry, and the environment cannot work in isolation.

All national policy initiatives must be scrutinised for their impacts on private sector investment as well as on rural wellbeing including farm and non-farm sectors.[21] Realising the farm-nonfarm nexus, appropriate institutional set up for coordination has to be set in place. Further, the financial institutions providing agricultural credit and microfinance need to be geared in favour of resource poor farmers and landless dominating not only the agricultural production system but also most of them are extremely poor and food insecure.

Socio-economic research could play a vital role in putting research on track for delivering specific outputs that are expected from the agricultural research system. For this purpose social sciences may be strengthened to assess research outputs in terms of sustainability, relevance/ equity, quality, comparative advantage, competitiveness, value addition potentials, resource conservation and profitability. Agricultural research system is still deficient in quickly aligning itself to the changing market situations and achieving sustainable higher quality production levels—particularly food commodities. Research planning lacks focuses on prioritising research, strategic planning, implementing demand driven research, independent assessment of research outcomes, planned promotion of viable research outcomes and developing public-private partnerships to promote/upscale technologies. Following are the priority research areas to be focused on:

- developing technologies both in terms of genetic modifications of crops that improve water productivity and bring breakthroughs in the use of saline water;
- improving systems' productivity by devising new practices for better soil fertility management, soil and water conservation, water harvesting, and integrated pest management, etc;
- cropping system based research to adjust to the climate change processes and combating natural resources degradation and improving system productivity;
- identification of factors responsible behind yield gaps and finding solutions to resolve stagnating productivity in different production systems;
- research in human food-safety issues in plant and animal origin food chain;
- developing technological packages to achieve low-cost and high quality products;
- enhancing balanced use of fertiliser and increasing organic matter availabilities; and
- encouraging small farmers' oriented corporate farming.

A few institutional initiatives may be undertaken immediately including:

- strengthening and reorganising Agricultural Policy Institute (API) so that besides farm economic analysis, I can handle macro level issues, particularly trade and policy analysis;

[21]This is called rural lens approach in Canada and in UK rural proofing [OECD (2007)].

- strengthening the existing (or establishing new if not existed) provincial Economic Research Institutes with bestowing additional mandate of food policy analysis; and
- establishing *"National Commission on Farmers (NCF).*

Role of the Government:

- Government should be proactive to the commodity crisis rather than act when the crisis already happened.
- There should be systematic commodity forecasting mechanism so that food demand-supply mechanism could more effectively be managed.
- A separate food security fund should be created, rather than diverting development resources in case the food production is below the national demands.
- Government may protect price bands in between import and export parity prices, rather than pan-territorial pricing that crowed out private sector.

7. CONCLUDING REMARKS

Reducing poverty, hunger and food insecurity are essential part of Millennium Development Goals. Pakistan is a low income developing country and agriculture is its most important sector due to its primary commitment of providing healthy food to her fast growing population. In past 60 years Pakistan, the total cultivated area has increased by just 40 percent, while there was more than 4 times increase in population with urban expansion of over seven-fold causing rising population pressure on cultivated land. Despite that wheat production has increased by five-fold, the country is still its marginal importer. Tremendous efforts are needed to narrow the gap between food demand due to population growth and domestic food production. Managing food security in Pakistan requires an understanding about how agricultural policies affect food supply and incomes, the poor vulnerable in rural and urban areas. The main focus of this paper is to trace the pathways to achieve/maintain food and nutritional security in Pakistan.

Unfortunately, the policy makers are only concentrating on attaining and maintaining self sufficiency in wheat production. Periodically, strong interventions are made in terms of significant increase in wheat support prices along with subsidising fertiliser prices to achieve bumper wheat crop. Such interventions seriously distort relatively profitability of cultivation of other *rabi* season food crops, e.g. other coarse grains, pulses and oilseeds.

On the other hand, the way government is managing procurement and distribution of food crops for low prices of wheat flour like offering wheat flour at subsidised prices, income support, cheap bread on *tandurs* etc., which has heavily burdened the national exchequer as well as encouraged development of different cartels and mafias, e.g. wheat flour industry, poultry hatchery and feed industry, etc. The recently adopted wheat procurement and private storage policy has heavily cost to national exchequer as only Rs 262.5 billion worth of wheat has been stored while Rs 414 billion are payable to banks.

A number of real world challenges and constraints have been highlighted for facilitating policy makers in designing a comprehensive food security policy for this country. In the way forward, some recommendations are made along with highlighting

the need of new institutions for developing a R&D based infrastructure as well as defining the role of the government in food sector of Pakistan.

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An Analysis of Energy Security Using the Partial Equilibrium Model: The Case of Pakistan

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1. INTRODUCTION

Restricting energy imports and total primary energy supply are the two direct policy options used for the improvement of energy security. Restricting energy imports directly reduce energy import dependency that leads to diversification of energy resources and ultimately enhances energy security while total energy supply reduction affects the energy security through the diversification of efficient technology mix and energy resources supply mix.

As energy is a vital element for sustained economic growth and development, therefore energy consumption is used as a basic indicator of people living standards. Due to technological and industrial development, the demand of energy in Pakistan is increasing more than the total primary energy supply; therefore, it is confronting the severe energy deficit today. So there should be a serious concern for the government about the energy security and should take enough actions for the development of indigenous alternative and renewable energy resources.

Energy security, particularly security of oil supply, has become a key political and economic issue in recent years. Energy security in simple words means the security of energy supply. From economic point of view, energy security refers to the provision of reliable and adequate supply of energy at reasonable prices in order to sustain economic growth.

Pakistan as an energy deficient country is facing the challenge of energy security. A few papers analysed this issue highlighting just the energy situation of the country, ignoring the analytical side of the issue. Sahir and Qureshi (2007) gave an overview of the energy security issues in the global and regional perspectives and depicted the specific implications and concerns for Pakistan. Moreover, the global and regional energy security is not vulnerable to shortage of energy resources but may be exposed to energy supply disruption and availability of tradable resources and threatened by growing terrorism and geopolitical conflicts.

Due to limited fossil fuel resources and poor economy, a huge portion of the population in Pakistan still have no access to modern day energy services such as electricity [see Mirza, *et al.* (2003); Mirza, *et al.* (2007a); Mirza, *et al.* (2007b)]. To

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overcome energy shortage, Pakistan should develop its indigenous fossil energy resources and alternative renewable resources like mini-hydro, solar and wind [see Mirza, *et al.* (2007a); Mirza, *et al.* (2007b)]. Pakistan has a vast potential of mini-hydro, solar and wind energy resources, the exploitation of these resources could produce a enough electricity which could be provided to the northern hilly areas and the southern and western deserts. This will help in reducing dependency on fossil fuels import and also improve energy security.

Pakistan recorded a shortfall of 40 percent between demand and supply of electricity in 2008 [see Asif (2009)]. To overcome this shortfall, Pakistan has many sustainable energy option including hydro, biomass, solar, and wind resources. The total estimated hydropower potential is more than 42 GW and so for only 6.5 GW has been utilised. Although biomass is another conventional resource of energy in Pakistan but still it is commercialised. Solar and wind are also identified as potential energy resources but still it is not in operation on a vast scale.

This paper is analysing the effects of policies of restricting energy import and total primary energy supply on diversification of energy resources, technology mix in energy supply side and demand side; energy efficiency and energy conservation; and energy security during the planning horizon 2005–2050. A MARKAL-based model for an integrated energy system of Pakistan was developed to accomplish the research.

The paper is structured as follows. In Section 2 different policy options for energy security are presented. Section 3 gives an overview of Pakistan energy outlook. Section 4 provides the methodology and model formulation. Section 5 gives a brief description of the scenarios while analysis of the base case, energy import reduction case and primary energy supply reduction case is given in Section 6. Finally, Section 7 presents the main conclusions.

2. POLICY OPTIONS FOR ENERGY SECURITY IMPROVEMENT

Energy security is a wide and growing concept. In the 1970s and 1980s, energy security was perceived as reducing oil imports level and controlling the risks associated with those imports. Today, energy security takes into account other types of energy (i.e. natural gas and liquefied natural gas), and risks such as accidents, terrorism, under-investment in infrastructure and poorly designed markets. All of these might restrict sufficient supplies of energy at reasonable prices [see IEA (2007b)].

Now-a-days, the concept and definition of energy security is more broadened as compared to 1970s and 1980s concept. The broad definition of energy security contains four major elements i.e. physical availability of energy resources, accessibility to energy resources; affordability (economic element) and acceptability (environmental and societal element) [see IEA (2007c); APERC (2007); CIEP (2004)]. One can see clear conflict between affordability and acceptability as low energy cost will induce more energy demand and thus threats to environment and resource scarcity. On the other hand, achieving environmental targets will lead to higher energy cost.

From a poor developing country point of view, energy security is a very important component in their paths out of poverty [see Saghir (2006)]. Energy increases poor people's productivity and incomes; lighting and power improve their health and enable them to participate in education, and help them connect to the global market.

The International Energy Agency, World Bank and many other expect global energy demand to increase by at least 60 percent over the next 20 years. Two-thirds of the increase in global energy demand will come from developing countries. The dominant factors behind this global rising energy demand are sustained population rise in developing countries; urbanisation and expected improved mobility etc. [see Tempest (2004)].

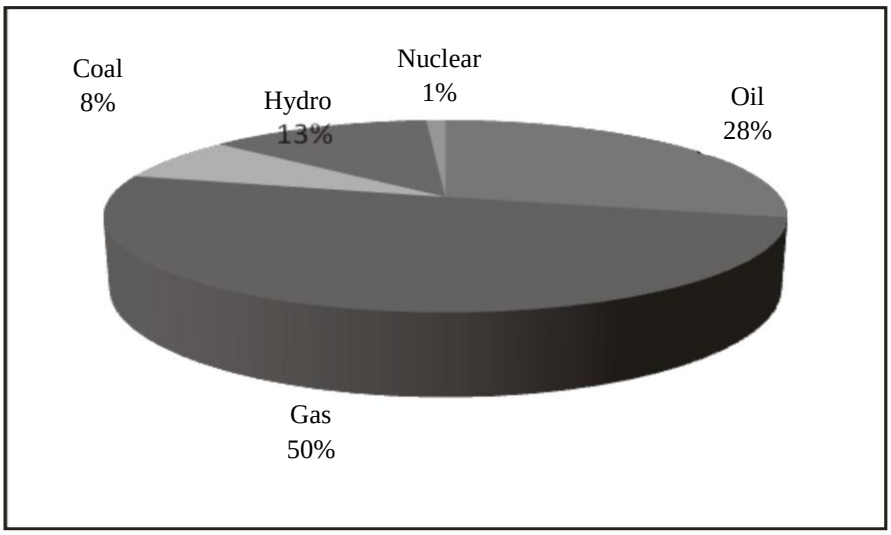
With the rapid increase in energy demand and energy prices, policy makers, researchers and stake holders in different institutions like International Energy Agency etc perceive that energy security would be the most important factor for the development of future energy policies of the different countries of the world. The main question in front of policy makers is: How to improve energy security and what are the different policy options? In the literature on energy security, a number of demand and supply side options to improve energy security of a country are discussed. The major options Total Primary Energy Supply Reduction, Energy Import Reduction, Renewable Energy Promotion, Carbon tax, Energy Conservation and Efficiency, Diversification of energy resources and sources of supply. These options may be different for developed, developing and less developed countries depending upon their energy needs, energy resources and the financial.

There are different types of energy security indices which are used to evaluate and distinguish different policy options in the energy security perspective [See Kruyt, *et al.* (2009); Grubb, *et al.* (2006); APEC (2006); Energy Research Centre of the Netherlands (2004)]. These indices are divided into simple indices or indicators, aggregated indices and some indicators are related to the various elements of energy security.

3. PAKISTAN ENERGY OUTLOOK

Pakistan energy sector consists of electricity, gas, petroleum and coal. Oil and gas are major contributors to the Pakistan primary energy supply mix. (Figure 1) The primary energy supply mix of Pakistan consists of 78 percent oil and gas, 13 percent hydro, 8 percent coal and 1 percent nuclear [see Pakistan (2006-07)]. Pakistan indigenous oil production meets only one-sixth of the current oil demand while imports one-third of the total energy demand. This implies that Pakistan's energy demand is more than the energy supply from the internal resources, and indicates that Pakistan is a net importer of energy.

Historical data shows that Pakistan has been dependent on oil imports from the Middle East since it came into being. The crude oil imports for the year 2005-06 was about 8.56 mtoe as compared to local production of crude oil 3.24mtoe and the imports of petroleum products were about 5.85 mtoe. The cost of all these oil and petroleum products was equivalent to US$ 4.6 billion which is roughly equal to 25-30 percent of the total import bill. This huge import bill put enormous pressure on the economy [Pakistan (2005)]. On the other side, the primary energy demand has increased significantly but the primary energy supply remained at same level, which created a huge gap between demand and supply. As a result, the country is facing huge energy shortage problems.

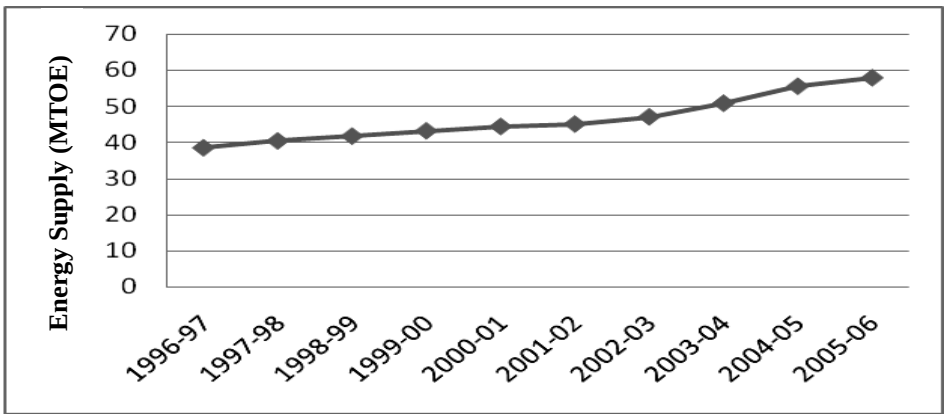


Source: Pakistan Economic Survey 2006-07.

Fig. 1. Primary Energy Supply by Source (2005-2006)

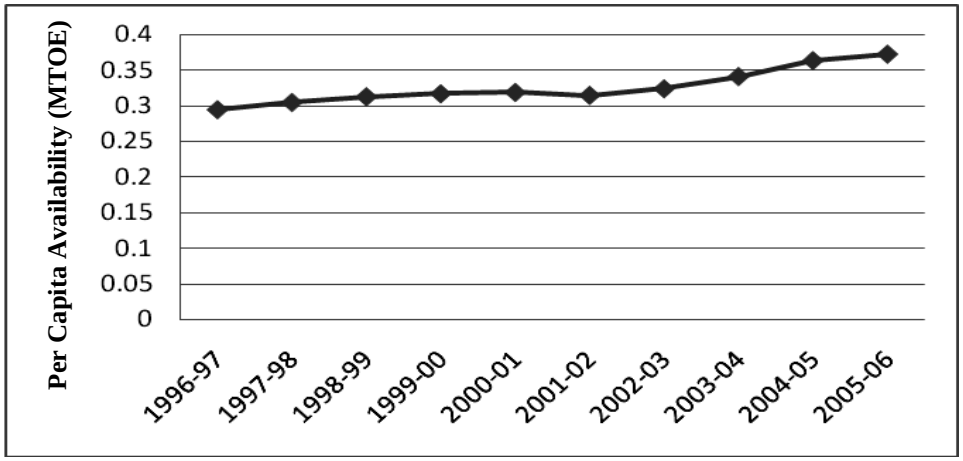
Pakistan imports about 29 percent of total primary commercial energy. Although Pakistan has a variety of energy resource, but approximately 80 percent of the energy supply is from oil and natural gas. The dependence on imported fuels especially on imported oil is likely to increase, which will affect badly Pakistan's economy. To avoid this negative impact, we should explore opportunities for untapped large renewable energy resources in the form of mini-hydro, solar and wind so that Pakistan can fulfil its energy needs and keep up its economic growth.

Figure 2 and Figure 3 display the annual trends of primary energy supplies and their per capita availability from 1996-97 to 2005-06, which indicates that the primary energy supply has increased by 50.2 percent and the per capita availability by 26 percent in the last 10 years.



Source: Pakistan Economic Survey 2006-07.

Fig. 2. Primary Energy Supply



Source: Pakistan Economic Survey 2006-07.

Fig. 3. Per Capita Energy Availability

4. METHODOLOGY

4.1. Model Formulation

This study makes use of bottom up MARKAL-based least cost energy system model as an analytical framework for the analysis of energy security in case of Pakistan [Loulou, *et al.* (2004)]. It models the flows of energy in an economy, from the source of primary energy supply, conversion of primary energy into secondary energy, and finally the delivery of various forms of energy to the end-use services. In the model, these flows of energy are described through detailed representation of technologies providing an end-use demand. Figure 4 shows the simplified structure of the MARKAL modelling framework through reference energy system of Pakistan.

Basically, Pakistan energy system model consists of four modules; primary energy supply, conversion technologies, end-use technologies and demand for energy services. Primary energy supplies are hydro, crude oil, natural gas, imports of oil, nuclear, solar wind etc, while conversion technologies module consists of power generation and transmission systems, oil refineries, natural gas processing and transmission systems. Service energy demand is grouped into five sectors: agriculture, residential, commercial, industrial and transport sector (see Figure 4).

End use demands are a measure of the useful energy output provided by the demand technologies in each end use demand category. It is assumed in MARKAL that the essential energy demand is for some service (an amount of cooking or heating), while the basic service is fixed, it can be provided by different mixes of devices and fuels. End-use demand technologies and conversion technologies are described in detail in Appendix A and B.

The objective function of the least cost energy system is to minimise the total discounted cost during the planning horizon; the total cost comprising of capital cost net of salvage value, fuel cost, operation and maintenance costs. The optimal solution given by the model must satisfy energy demand satisfaction, capacity and energy demand-supply balance constraints.

4.2. Service Demand Projection

Service energy demand is projected through three different techniques using econometric models as well as using identity relating service energy demand in particular sector to GDP and Value Added of the particular sector. In the econometric approach, we consider dependent variables such as number of energy devices, passenger kilometres, ton kilometres etc to be depended on independent variables such as Gross Domestic Product (GDP) and population, while the other approaches consider the service demand of particular sector in particular year is depended on the service demand of sector in base year multiplied by the ratio of the current year GDP and base year GDP; the service demand of particular sector in particular year is depended on the service demand of sector in base year multiplied by the ratio of the current year value added and base year value added.

The econometric approach was used to project the service energy demand in transport and residential sector, while the service energy demand in industrial, commercial and agriculture sector was projected through economic value added and GDP approach.

Service demand projection for fans, air conditioners and cooking is based on the GDP growth through the following formulation:

$$SD_{i,k,t} = SD_{i,k,0} \times \frac{GDP_t}{GDP_o}$$

Where $SD_{i,k,t}$, $SD_{i\,k,0}$ are service demand of sector i sub-sector k, in year t and base year respectively, GDP_t and GDP_0 represent Gross Domestic Product in year t and Gross Domestic Product in base year.

Service demand projection for agriculture, commercial and industrial sector is based on the following formulation:

$$SD_{i,k,t} = SD_{i,k,0} \times \frac{VA_{i,k,t}}{VA_{i,k,0}}$$

Where $SD_{i,k,t}$ is service demand of sector i subsector k in year t, $SD_{i\,k,0}$ is service demand of sector i subsector k in base year, $VA_{i\,k,0}$ is the ith sector kth subsector value added in the base year and $VA_{i\,k,t}$ is the ith sector kth subsector value added in the year t.

Electricity-related service demand and supply was considered in six time slices along with two seasons (summer and winter) and two periods (peak and off-peak) so that the variation of electricity loads on the energy system can be reflected.

5. SCENARIOS DESCRIPTION

Three scenarios were studied: (i) Base case, (ii) energy import reduction case, and (iii) primary energy supply reduction case. Details of the scenarios are expressed as follows.

5.1. Base Case

In this case, Pakistan GDP growth rate was assumed to grow at an annual growth rate of 7.0 percent and the growth rate of population was estimated at an annual growth rate of 1.9 percent based on the GDP and population data for the period of 2000-2013 [Pakistan (2006-07) and World Economic Outlook Database (2008)].

Under the base case, the maximum available stock of fossil energy resource (e.g., coal, oil and petroleum products, and natural gas) was estimated as the sum of proven reserve of the resource, its probable reserve and its possible reserve. In the power sector, renewable energy options (hydro, wind, and solar), natural gas-based power plants as well as nuclear power plant were included in the model. The options considered for the transportation sector include road, water and air transports.

5.2. Energy Import Reduction Case

For the classification of policy options for the improvement of energy security of Pakistan, we imposed three different types of energy import constraints in the MARKAL model for Pakistan. On the basis of these constraints, we analysed import dependency, diversification of energy sources and diversification of supplier of energy sources, vulnerability, and energy intensity for the whole planning horizon. The constraints are:

(a) **IEC05**—the target limit of energy import of alternative case is 95 percent of energy import of base case by 2050.
(b) **IEC10**—the target limit of energy import of alternative case is 90 percent of energy import of base case by 2050.
(c) **IEC15**—the target limit of energy import of alternative case is 85 percent of energy import of base case by 2050.

5.3. Primary Energy Supply Reduction Case

The policy of reducing primary energy demand is used to target energy efficiency in whole energy sector. In order to assess the performance of the policy both in terms of energy security and energy efficiency improvement, following alternative cases having different targets of total primary energy demand are analysed. Apart from the special constraint defined bellow for each case all other things are kept same as in the base case. The constraints are:

(a) **TPEC95**—Target is limiting total primary energy demand of alternative case to 95 percent of total primary energy demand of base case by 2050.
(b) **TPEC90**—Target is limiting total primary energy demand of alternative case to 90 percent of total primary energy demand of base case by 2050.

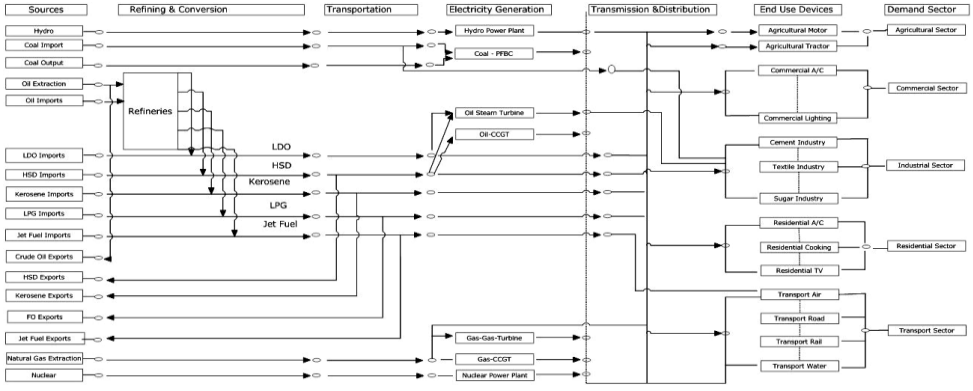


Fig. 4. Reference Energy System for Pakistan

6. ANALYSIS OF THE BASE CASE

Energy system development of Pakistan during the planning horizon of 2000-2035 under the base case is discussed as follows:

6.1. Primary Energy Supply in the Base Case

As can be seen from Figure 5, the primary energy supply in the base case shows an increasing trend over the whole planning horizon 2005-2050 indicating the rising energy supply and per capita energy availability. The primary energy supply in Pakistan is found to increase from 2894.4 PJ in base year to 26204.6 PJ by 2050. Results from model simulation show that Oil is the major part of primary energy supply through out the planning horizon, while gas, coal, renewable and nuclear are also contributing to primary energy supply.

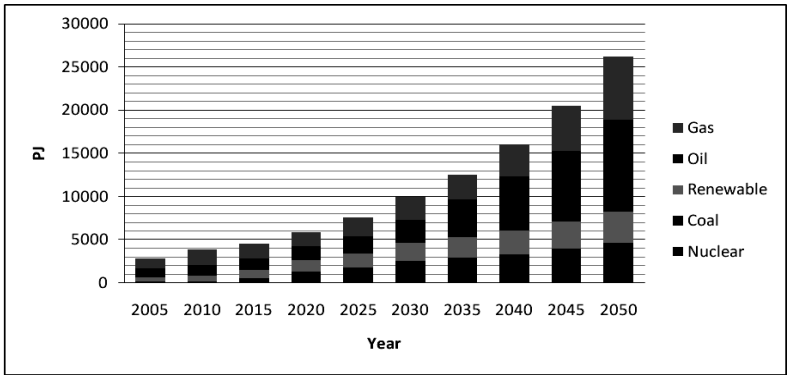


Fig. 5. Primary Energy Supply in Base Case

The fuel consumption in the base case is shown in Fig 6 consisting of coal, diesel, gasoline, fuel oil, jet oil, kerosene, LPG and others. During the planning horizon, the fuel consumption mix of Results from estimated model show that gas and oil products gas would have the largest share in total fuel consumption by 2050 followed by coal, LPG and other fuels. Although, gas hold the largest share in fuel consumption in the base year, the percentage share of gas in fuel consumption is declined from 46 percent in 2005 to 28 percent by 2050, while the percentage shares of oil in fuel consumption is increased from 37 percent in 2005 to 41 percent by 2050.

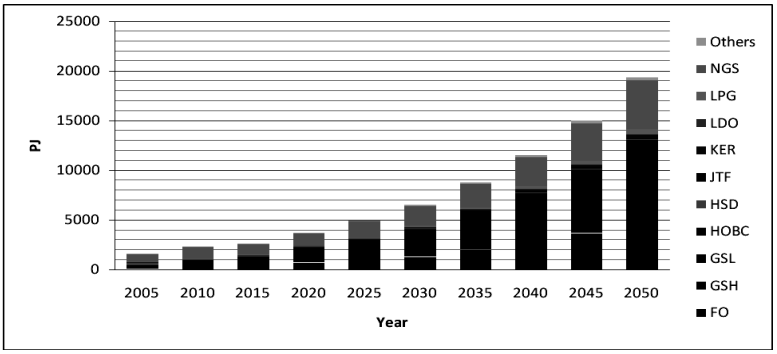


Fig. 6. Fuel Consumption in Base Case

As can be seen from Figure 7, sector wise fuel consumption in the base year is dominated by industrial followed by transport, residential, commercial and agriculture sector and same trend is prevailed for the whole planning horizon 2005–2050.

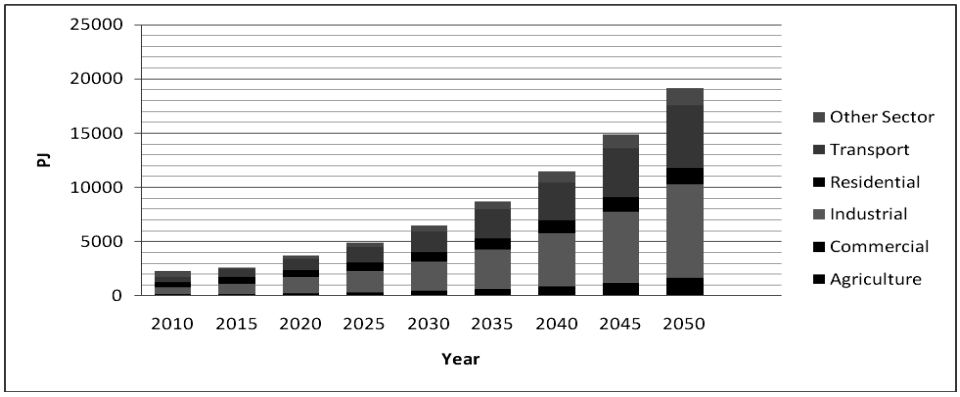


Fig 7. Sector wise Fuel Consumption in Base Case

6.2. Energy Security Indices in Base Case

The prime objective of this research is to classify policy options for the improvement of energy security of Pakistan. The fundamental and suitable criterion for the classification of policy options are the calculation of energy security indices for the whole planning horizon 2000-2035. In this study, four energy security indicators are used, i.e., Net Energy Import Ratio (NEIR), Shannon-Wiener Index (SWI), Diversification of Primary Energy Demand (DoPED) and Vulnerability Index (VI) are estimated by using the MARKAL model which is energy-system model depicting long-term development of the energy-system. Those indicators are explained as follows:

$$NEIR = \frac{Net\ Importers}{(Domestic\ Production + Net\ Importers)}$$

The value of NEIR close to 1 indicates that the energy system of that country is to a large extent dependent on energy imports.

$$SWI = -\sum_i x_i \ln(x_i)$$

where x_i represents the share of energy supply from each source. A higher value of SWI means well diversified energy sources ultimately leading to improved energy security while a lower value implies low diversification of energy sources and poorer energy security [Grubb, *et al.* (2006)].

$$DoPED = \frac{\sqrt{Coal^2 + Oil^2 + Hydro^2 + Biomass^2 + Other^2}}{Total\ Primary\ Energy\ Demand}$$

Where the value of *DoPED* close to 1 indicates that the economy is reliant on one energy resource while a value close to zero (0) means that the energy sources in the economy are uniformly spread among several energy resources.

6.3. Energy Security under Energy Import Reduction

For the classification of policy options for the improvement of energy security of Pakistan, we imposed three different types of constraints (e.g. IEC5, IEC15, IEC20). These constraints are briefly explained in section 5.2) in the MARKAL model for Pakistan. On the basis of these constraints, we analysed import dependency, diversification of energy resources, vulnerability, and energy intensity for the whole planning horizon.

As can be seen from Figure 8, primary energy supply under 5 percent and 10 percent energy import reduction decreases as compared to the base year case, while primary energy supply under 15 percent energy import reduction increased as compared to the base case.

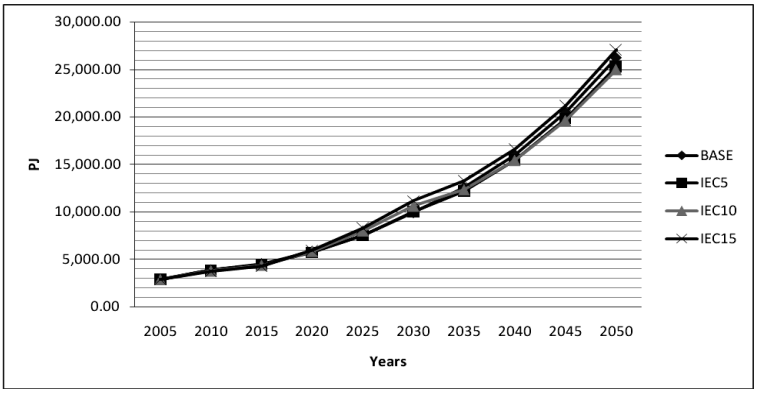


Fig.8 Primary Energy Supply under Energy Import Reduction

6.3.1. *Energy Import Dependency under Energy Import Reduction*

Net Energy Import Ratio (NEIR) is an important index used for the analysis of energy security and it is also used an approximate measure for energy import dependency. As can be seen from Figure 9, the net energy imports from the rest of the world indicated by NEIR would reduce. The reason for this declining import dependency would be the increased shares of indigenous energy resources (coal and renewable) in the energy system. Ultimately, the energy security of Pakistan would be obviously improved during 2005–2050.

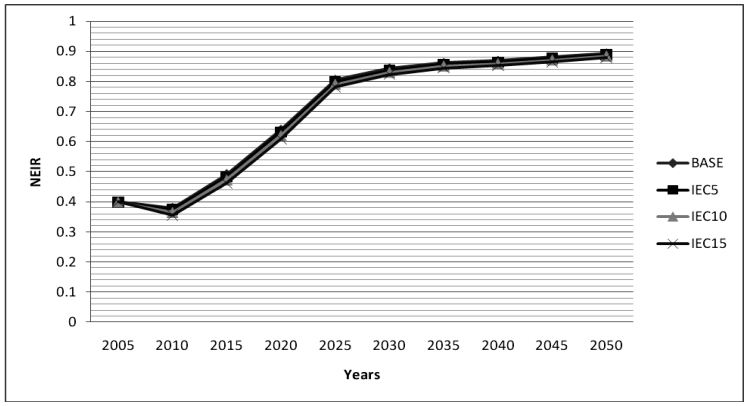


Fig. 9. Import Dependency

6.3.2. *Diversification under Energy Import Reduction*

Diversification of energy resources plays a crucial role in the improvement of energy security. *DoPED* and SWI are used to show the variation of diversification among different energy resources. As can be seen from Fig. 10, the value of *DoPED* reduced from 0.61 in the 2005 to 0.52 by 2050 under 15 percent energy import reduction implying better diversification among different energy resources as compared to the base case. Diversification can also be analysed through Shannon-Wiener Index (SWI); higher value of SWI implies better diversification among different energy resources. Figure 11 depicted the model simulated values for SWI which indicates that the value of SWI increases from 0.49 in 2000 to 0.58 in 2050 under the energy import restrictions showing better diversification among energy resources in all cases of the planning horizon (2000–2050). Both the indices ultimately would imply better diversification of energy resources by 2050 as compared to 2005 that lead to energy security improvement in Pakistan by 2035.

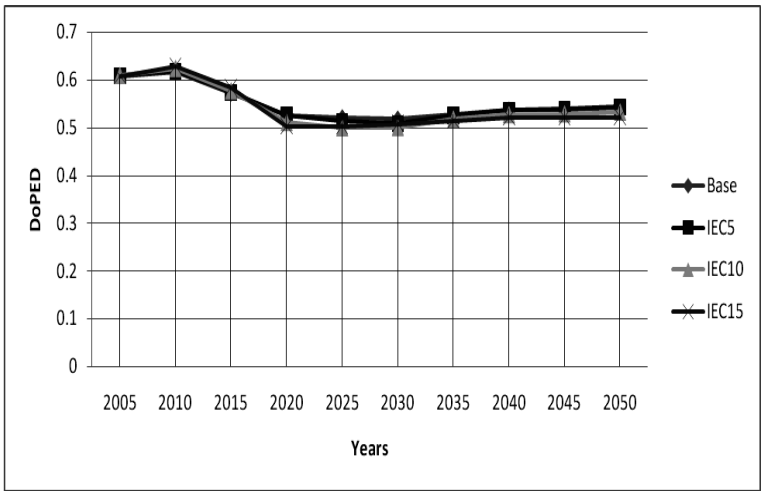


Fig. 10. Diversification of Energy Resources (DoPED)

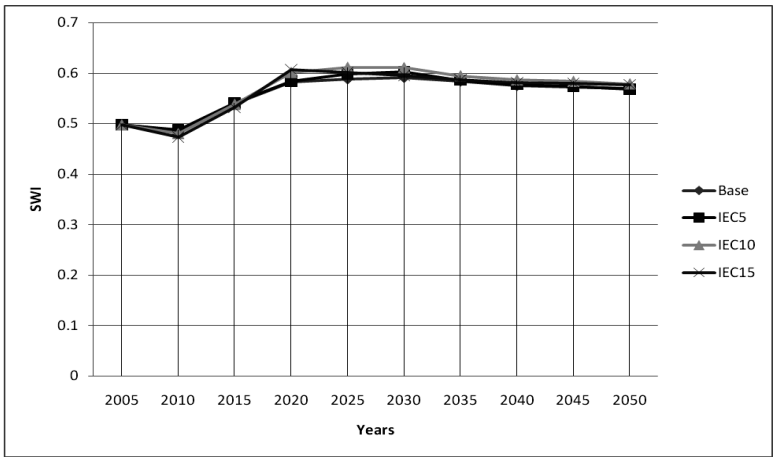


Fig. 11. Diversification of Energy Resources (SWI)

6.4. Energy Security and Primary Energy Supply Reduction

Primary energy supply reduction is another direct policy option to improve energy security of the country. This policy works through increased energy efficiency and fuel switching that reduce primary energy demand. Efficient technologies will be selected when reduced primary energy supply and final energy demand will be decreased due to high efficiency of efficient technologies that will lead to primary energy demand reduction.

6.4.1. *Primary Energy Supply under Primary Energy Supply Reduction Constraint*

As can be seen from Figure 12, total primary energy supply in the base case is more then other cases where model restrict the primary energy supply by 95 percent and 90 percent of the base case. The reduction in primary energy supply is smooth in all the primary energy reduction constraints during the whole planning horizon 2005–2050. Total primary energy reduction targets do not help to improve the energy security of the country but they help to improve the overall efficiency in the energy system.

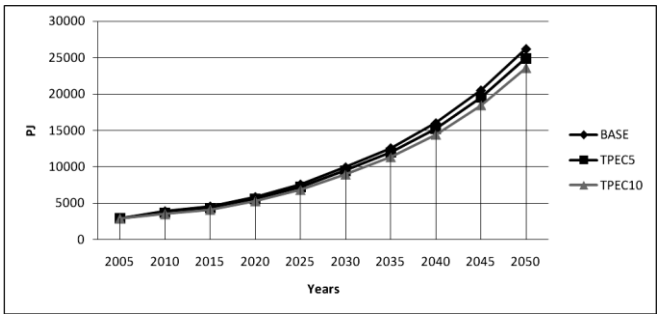


Fig. 12 Primary Energy Supply under Primary Energy Supply Reduction

6.4.2. *Energy Import Dependency under Primary Energy Supply Reduction Constraint*

The energy import dependency represented by net energy import ratio (NEIR) shown in Figure 13 is reflecting lower amount of energy import by 2005 as compared to base case. This decrease in net energy import ratio implies improved energy security. Therefore, primary energy supply reduction may be an appropriate policy option for reducing import dependency and the enhancement of energy security.

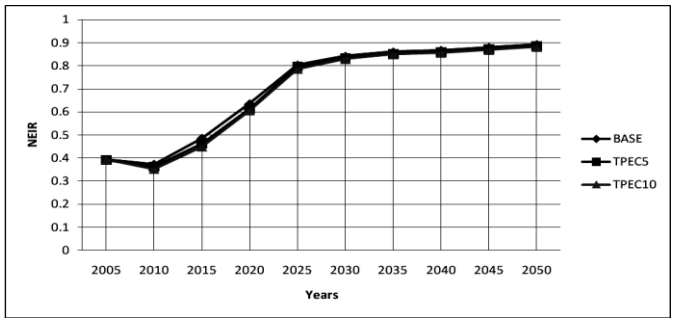


Fig. 13. Net Energy Import Ratio under Primary Energy Supply Reduction

6.4.3. *Diversification under Primary Energy Supply Reduction Constraint*

Beside the import dependency factor, diversification is another important factor of the energy security for developing and developed countries. Diversification can be viewed from two perspectives: diversification of energy sources and diversification of supplier of energy sources. As can be seen from Figure 14, the value of DoPED decreases from 0.60 in 2000 to 0.55 in 2050 i.e., diversification of primary energy resources improved by 9 percent by 2035 as compared to 2000. The same result is obtained through SWI shown in Figure 15. The value of SWI increases from 0.49 in 2000 to 0.558 indicating better diversification of energy resources by 2050 as compared to the base case. The improved diversification of energy resources by 2050 leads to enhanced energy security.

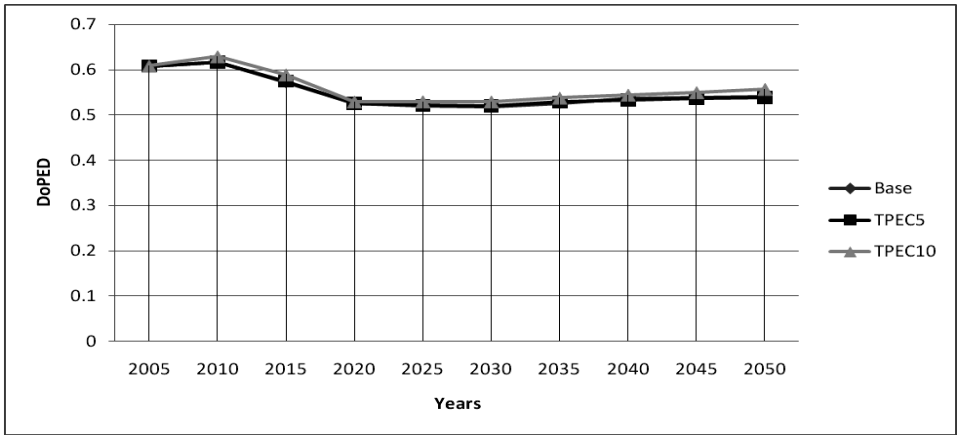


Fig. 14. DoPED under Primary Energy Supply Reduction

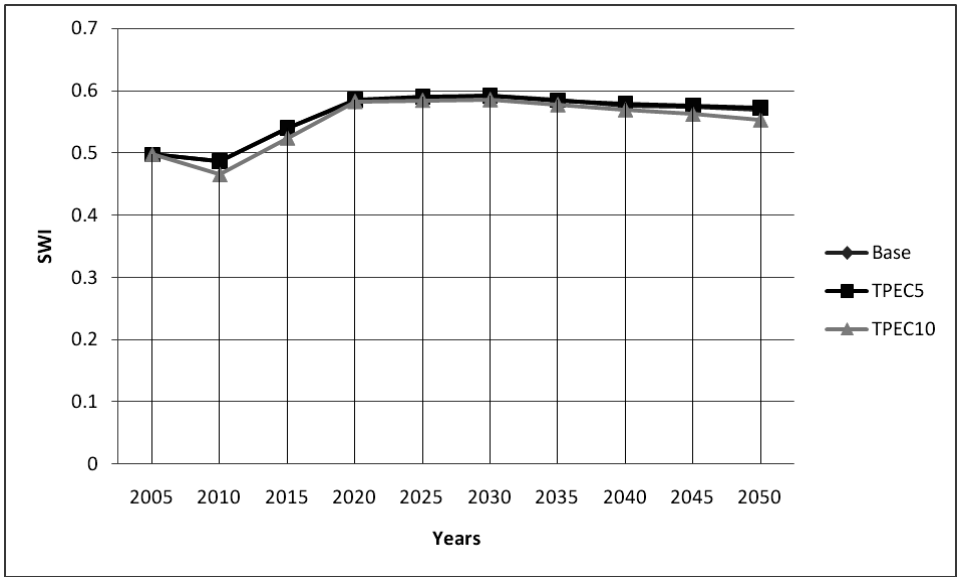


Fig. 15. SWI under Primary Energy Supply Reduction

7. CONCLUSIONS

This paper investigates the effects of policies of restricting energy import and total primary energy supply on diversification of energy resources, technology mix in energy supply side and demand side; energy efficiency and energy conservation; and energy security during the planning horizon 2005-2050. A MARKAL-based model for an integrated energy system of Pakistan was developed for this cause.

The study also provided a very brief overview of different policy options for the enhancement of energy security. Restricting energy import and primary energy supply are the two policy options which are implemented in the MARKAL model for Pakistan for the analysis of energy security. The effects of these two policies on the energy security of Pakistan are analysed through the estimation of energy security indicators for the base case as well as for these two policy options with the planning horizon 2005–2050.

Restricting energy import is a direct and command type of policy option for the improvement of energy security and is appearing to be working in case of Pakistan. Looking at the energy security indicators, all energy security indicators in case of energy import reduction demonstrate improvement in the energy security as compared to base case. Net energy import ratio decreases, diversification of energy resources improves. Therefore, energy import reduction may be one of the best policy options for the improvement of energy security of Pakistan.

Primary energy supply reduction is another direct policy option to improve energy security that works through increased energy efficiency and fuel switching that ultimately reduces primary energy demand. By restricting primary energy supply, energy import dependency decreased in all cases as compared to base case. Diversification of energy resources demonstrates quite considerable improvement as compared to base case. All these facts imply that primary energy supply reduction can be used one of the policy options for the enhancement of energy security in case of Pakistan.

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Using the Health Belief Model to Understand Pesticide Use Decisions

MUHAMMAD KHAN

1. INTRODUCTION

Farmers use pesticide to protect their crops from pests which in-turn help them maximise agricultural output on limited acres of land. However, the extensive use of such pesticide results in substantial health and environmental threats. According to WHO (1990) pesticide use causes 3.5 to 5 million acute poisonings a year. Rough estimates show that 20,000 workers dying from exposure every year and most of them from developing countries.

The literature shows that health and environmental hazards of pesticide use occur due to lack of information, awareness and knowledge which are chief contributing factors of extensive overuse or misuse of hazardous pesticide and dangerous practices [Forget (1991); Dasgupta, *et al*. (2005a); Ibitayo (2006)]. Research has also shown that health and environmental hazards of pesticides can be avoided by awareness, education and changing farmer's attitude and behaviour regarding pesticide use [Dasgupta, *et al*. (2005a)]. Therefore, the first step in developing pesticide's health and environmental hazard reduction policy is to set up the extent of the problem by investigating farmer's attitudes and behaviours regarding pesticide use [Koh and Jeyaratnam (1996); Dasgupta (2005a, 2005b)]. Such information is critical to identify the 'prospects and constraints to the adoption of alternative crop protection policy' [Ajayi (2000)].

According to classical microeconomic consumer theory, individuals make choices following their preferences. However, classical microeconomic models of consumer behaviour are poor in explaining and predicting consumer behaviour and do not focus on the processes of individual's reasoning behind choices. An obvious shortcoming of the microeconomic models is that they do not consider psychological, sociological, and other (noneconomic) factors that guide consumer behaviour [Huang (1993)].

Theories of cognitive psychology show that at personal level, people develop risk understandings through two interacting systems: a cognitive analytic system and an intuitive experiential system. Experiential information is more meaningful to change behaviour than abstract information [Severtson (2006)]. According to Leventhal (1983), experiences drive most of the risk perceptions and outcomes. One of the factors that affect whether or not farmers adopt environmentally sound behaviour of pesticide use is,

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'whether or not they have experienced a personal health effect' [Lichtenberg, *et al.* (1999)]. As health psychology literature says that most of our knowledge in our lives comes from actual personally relevant experiences rather than from intellectual exercises. Williamson (2003), in the context of farmers field schools says that it has been found that adults learn best from experience; firsthand knowledge is superior to information received from others. Communication researchers recommend applying behavioural theory to understand psychological processes that explain the relationship between experience and behaviour [Severtson (2006)]. The health belief model provides a framework for understanding the effect of experience on perception and outcomes. This study therefore combines an approach from social psychology with new classical theory to illustrate individual reasoning behind their decisions [Pouta (2003)].

Objective of the Study

The purpose of present study is to apply the health belief model to explore how farmers respond to information about and perceived experience with the threat of pesticide. It also attempts to analyse the implications for the adoption of alternative crop protection strategies at the farm level.

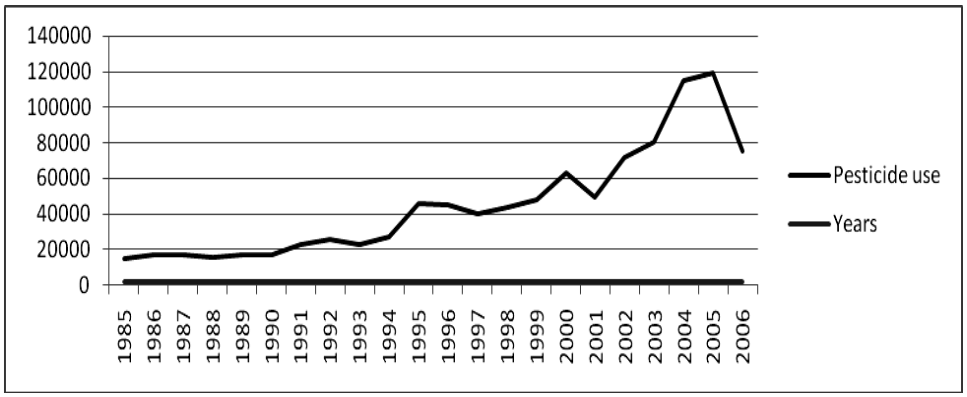
The specific objectives of the study are:

(a) To identify pesticide associated health effects experienced by farmers.
(b) To assess the relationship between health effects, risk perceptions and adoption of alternative pest management which is environmentally sound.
(c) To identify prospects and constraints in adoption of Integrated Pest Management (IPM) in the area.

2. REVIEW OF LITERATURE

The use of pesticide begun in 1952 in Pakistan. Government of Pakistan, like other developing countries, provided full support for the use of pesticide to save crops from pests and diseases [Rasheed (2007)]. Pesticide use grew at the rate of 11.6 percent on average over the last twenty years or so, reaching 117513 metric tonnes in 2005 which was 12530 metric tonnes in 1985. This massive increase in pesticide consumption contributed very little to improve the yield of crops, however, the rapid increase in pesticide use has caused a huge cost in terms of human health and environment. Azeem, *et al.* (2002) estimated that the environmental and social cost of pesticide use in nine major cotton growing districts in Punjab is 11941 million Pak-rupees per year. While estimating health and environmental cost, they reported that about 1.08 million persons were subjected to pesticide associated sickness, among those 24000 persons were hospitalised because of serious illness and about 271 fatalities were happened in these districts. In another study, Hassan (1994) reported that 22 out of 25 blood samples of farmers were found contaminated with pesticide residues in Multan Division. Similarly, Jabbar, *et al.* (1992) reported the result of blood samples of 88 female cotton pickers in cotton growing areas of Punjab which shows that nearly 74 percent female cotton pickers had blood (AChE) inhibition between 12.5 to 40 percent, while 25 percent of them were in dangerous condition where blood AChE inhibition was between 50-87.5 percent.

In addition to health effects, many studies [e.g. Iqbal, *et al*. (1997); Hasnain (1999); Azeem, *et al*. (2002)] have noted that indiscriminate use of pesticide has resulted in development of resistance in pests against the pesticide which ultimately leads to increase in their population. Due to extensive use of pesticide, the flora and fauna have been destroyed causing imbalance in agro-ecosystem and biodiversity [Iqbal, *et al*. (1997)]. Studies have also noted that in cotton growing areas of the country, the population of natural enemy pests has declined substantially [Hasnain (1999)].



Source: Agricultural Statistics of Pakistan, 2008.

Fig. 1. Pesticide Consumption in Pakistan (mt)

Pesticides are intensively used on cotton in Pakistan which accounts for about 80 percent of the total consumption of active ingredient of pesticide [NFDC (2002)]. Most of the pesticides used are insecticide including organophosphates, which are in the WHO hazardous categories I and II. The field evidence [Poswal, *et al*. (1998); Iqbal, *et al*. (1997); Hasnain (1999); Azeem, *et al*. (2002)] shows that farmers have moved to high levels of dependence on the use of pesticide. This reliance on pesticides has led to increased future costs of pest's control since such frequency of pesticide use leads to disturb or even breakdown in the ecological balance between the pests and their predators. The evidences from cotton growing areas have revealed that dependency on pesticide use has already led to the development of pest resistance for cotton pests, further reinforcing farmer's reliance on chemical pesticide. For example Poswal, *et al*. (1998) and Husnain (1999) have reported that the rapid increase in pesticide consumption has destroyed the bio-control agents in the agro-ecosystems and the populations of natural predators in cotton growing areas of Pakistan without contributing any productivity improvements. The best examples are the experiences with the major outbreaks of the Cotton Leaf Curl Virus (CLCV) in early 1990s, Burewala Strain of Cotton Virus and Mealy Bug in the beginning of 2000s which have done colossal damage to cotton crop.

Given Pakistan's agriculture settings and cash crops security situation, it can be expected that current crop protection practices will likely continue to be the main system in the country. There will be a growing use of agricultural pesticide because farmers recognise pesticide to have larger impacts on crop yields. The trust on pesticide for plant

protection is expected to lead to more dependence on and to rising use of pesticide due to rapid development of resistance among pests. Therefore, there is an urgent need to address pesticide issues, so that rural communities can be secured from pesticide associated health and environmental damage which also put huge toll to the economy.

3. DATA METHODOLOGY AND RESEARCH DESIGN

Cotton has been identified as the major crop which accounts more than 80 percent of total pesticide use in Pakistan [NFDC (2002)], whereas more than 80 percent of cotton is produced in Punjab province and being the center of cotton crop the cotton zone of the Punjab has been recognised as the most intensive with respect to pesticide use. Overall two districts Lodhran and Vehari in Punjab province are selected for study area which are historically famous for cotton production and have a long history of pesticide use, an approximately 50 years [Khan (2009)]. Both districts represent more than 17 percent area under cotton cultivation in Punjab [Agriculture Census (2000)]. In addition, the selection of these districts is also based on the understanding that a reasonable data of farmers currently using IPM could be available and that the farmers of these districts are very much aware of IPM since the government has undertaken the activities of Farmers Field School (FFS) and Training of Facilitators (TOF) under the umbrella of National Integrated Pest Management (IPM) programme in these districts.

The technique of multi stage cluster sampling was used to obtain cross-sectional data. As a sampling strategy, after selection of study districts, all three tehsils were chosen for survey as the representative area. At least three villages (clusters), from every tehsil were selected purposively in each district to get the pesticide-related information from a sample of pesticide applicators. Overall, 915 farmers from both the districts, 412 from district Vehari and 503 from district Lodhran were enlisted [Khan (2009)]. Respondents for the interview were selected randomly from the numbers drawn until 318 interviews were successfully completed.

4. SURVEY RESULTS

Household Information: The average number of members per household[1] is 6.52. The average household size differs in districts, (6 in Lodhran and 6.8 in Vehari). Age of the surveyed farmers' ranges from 18 to 66 years, with an average age of 33.3 years approximately. Most of the farmers 113 were in age groups 21-30 (35.5 percent) and 101 were in age group of 31-40 (31.8 percent).

Over 73 percent of respondents had received education of different levels. About 6 percent of them also obtained graduation degree, whereas 26.5 percent of respondents had never in the school and could not read or write. In terms of higher education categories (matric and above) the farmers up to age 40 years are better educated than their older counterparts, this is probably due to changing attitude towards schooling and more opportunities available than the past. However, overall distribution is more or less same for all age categories.

[1]A household is defined to comprise all usual residents, where they sleep and share common facilities and share mutual reciprocal responsibility.

Table 1

Distribution of Education Attainment by Age Groups

	Education attainment					
Age Categories	Illiterate	Up to Primary	Middle	Matric	Higher Secondary and above	Total
Up to 20	5 (27.8%)	6 (33.3%)	2 (11.1%)	3 (16.7%)	2 (11.1%)	100.0
21-30	32 (28.3%)	25 (22.1%)	14 (24.8%)	29 (13.3%)	13 (11.5%)	100.0
31-40	27 (26.7%)	33 (32.7%)	15 (24.8%)	17 (6.9%)	9 (8.9%)	100.0
41-50	10 (20.0%)	13 (26.0%)	3 (36.0%)	19 (8.0%)	5 (10.0%)	100.0
51-60	9 (25.7%)	11 (31.4%)	5 (14.3%)	8 (22.9%)	2 (5.8%)	100.0
61+	1 (100.0 %)	0.0	0.0	0.0	0.0	100.0

Land Ownership and Farm Characteristics: The land tenure system in the study area is similar to other parts of Pakistan where land is commonly owned. The majority of farmers 75.5 percent owned land. More than 10 percent have rental arrangements and 6 percent of the respondents are sharecropper. About 8 percent of them have mixed arrangements. A large number of the farmers surveyed 99 (31 percent) hold either 5 or less than 5 acre of land. In terms of large land holding, only few of them had 50 acres or over, and most of them in district Lodhran, while a large percentage of respondent farmers (more than half) can be said small farmers in terms of land holding. The respondents average land area was 13.5 acres in district Vehari, and 14.5 acres in Lodhran district.

Risk Perception of Pesticide's Health Effects: According to the study results, the majority (88 percent) of farmers believed that they are at risk while using pesticide. Farmers were also asked to rank the risk. Five categories were presented and scaled as shown in the Figure 2. More than half 52 percent reported some small risk, 23 percent a medium amount of risk, 10 percent believed that the risk is large and significant, 3 percent said that the risk is very toxic, however 12 percent believed that there is no risk at all.

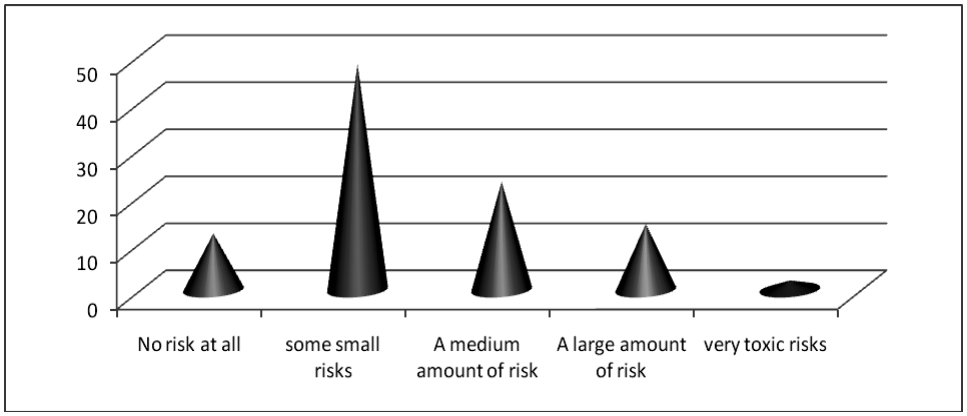


Fig. 2. Farmer's Perception of Pesticide Risk (%)

Health Effects of Pesticide Use: Farmers were asked if they experienced any health impairment after mixing and spraying pesticide. Almost 82 percent of them said they experienced health impairment after mixing and spraying pesticide. The most

common signs[2] and symptom[3] experienced were eye (irritation: 33 percent), neurological (headaches: 26 percent, dizziness: 13 percent), gastrointestinal (vomiting: 9 percent), respiratory (shortness of breath: 10 percent), dermal (skin irritation: 33 percent) and (fever: 2 percent).

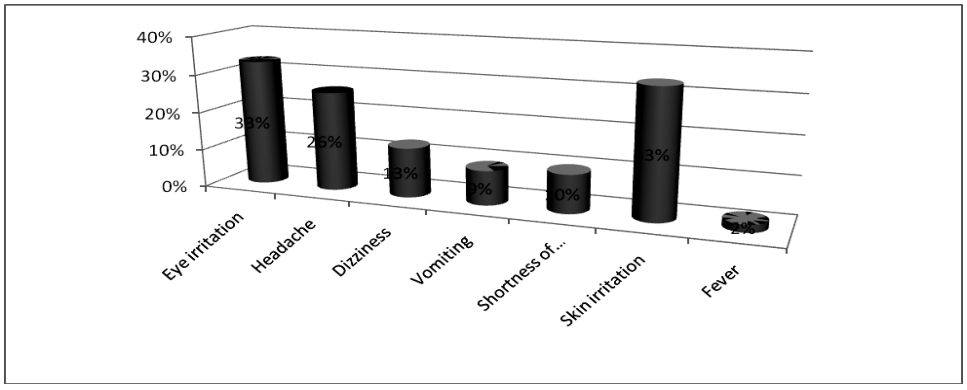


Fig. 3. Distribution of Health Effects Experienced by Farmers (%)

5. CONCEPTUAL FRAMEWORK

This study seeks theoretical support from Health Belief Model[4] to understand farmer's environmentally safe behaviour of pesticide use. The Health Belief Model was developed (originally) as a research tool to predict and explain preventive health behaviour [Green (2010); Stretcher (1997)]. Within the framework of health belief model, an individual's motivation to undertake a health behaviour can be divided into three main categories:

(i) Individual perceptions.
(ii) Modifying behaviours.
(iii) Likelihood of action.

Individual perceptions are factors that deal with the importance of health to the individual. These factors affect the perception of disease or illness; these are perceived

[2]*Sign: something you can observe or see that requires an examination.

[3]*Symptom: something a person feels but you cannot see.

[4]The Health Belief Model has been chosen for the present study because of several reasons; (1) the Health Belief Model considers individual as active information processor and independent decision maker. Since pesticide use is largely governed by voluntary behaviour, hence health belief model best suits in present circumstances; (2) another advantage of HBM is its simplicity that makes it a promising model to understand health behaviour. HBM is different from other models of health psychology in that there are no strict guidelines as to how the different variables predict behaviour. Instead it proposes that independent variables are likely to contribute to the prediction of health behaviour [Nejad, *et al.* (2005)]; (3) the model comprises a series of broadly defined constructs that might explain the variance in health behaviour but there are no clear operational guidelines regarding relationships between them. Although this lake of structure is often a source of criticism, but at the same time, the flexibility of the model makes it attractive[4] among researchers. This is the reason that it is the most frequently used model in health psychology; (4) though, HBM is a health-specific model, it allows socio-economic variables to be included in the model which affect health motivation. Because of the features, discussed above, the HBM has received much practitioner and research support over the years [Munro, *et al*. (2007)].

susceptibility and perceived severity. The modifying factors include individual characteristics, demographic variables and cues to action. The likelihood of action includes factors in probability of taking suggested health action to prevent disease [Green (2010)]. The combined effect of these factors leads to an individual to undertake the recommended preventive health action.

One of the problems that emerged out of the HBM framework is that different questions have been used in different studies to determine the same perception or beliefs. Consequently, it is difficult both to design appropriate scales or tests of the HBM and to compare results across studies [Green (2010)]. The present study has adopted more direct approach to apply HBM in the context of farmer's health behaviour which avoids many of such problems. Instead of using an individual's perceived susceptibility to the cause of harm, following Lichtenberg and Zimmerman (1999) this study uses self-reported experience of a health problem from pesticide,—a relatively more direct measure of threat to health than perceived threat. The susceptibility component of health belief model is the one most closely analogous to the health experiences that farmers have reported in connection with pesticide. The actual experience of health problem heightens individual's perception regarding health threat which in turn, may or may not encourage them to change their own behaviour with respect to pesticide use and safety [Lichtenberg, *et al*. (1999)].

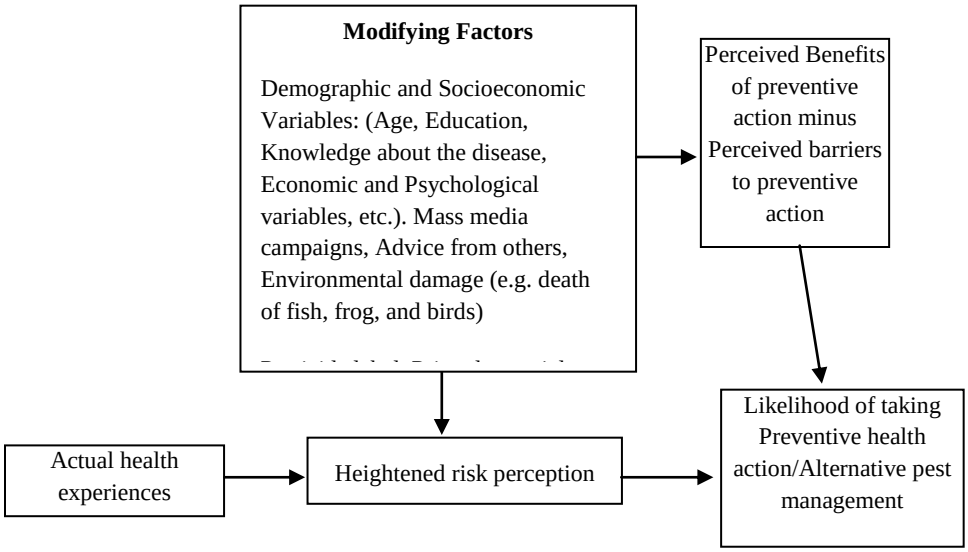


Fig. 4. Relationship Between Health Experiences, Risk Perception and Pesticide Use Behaviour

Health Experience, Farmers' Attitudes and Environmentally Sound Behaviour of Pesticide Use

One basic premise in new classic welfare (utility) economics is that individuals are best judges of their welfare and that inferences can be drawn about welfare (utility) for each individual by observing the individual's choice of bundles of goods and services

[Gunatilake (2003)]. Suppose a consumer (farmer) who consumes a product (pesticide) approaches the same product but in a safer form. A consumer who moves from consuming a usual product to the one which is assumed potentially safe to the health, presumably does so because choice of the safe product (pesticide) increases (or at least does not decrease) the utility of the consumption set, all other things being equal. If utility does not change, then a consumer will not rationally be willing to change with safe alternative, as an increase in price or efforts result in a lower level of utility compared to the base level of utility. If utility does increase, then a consumer may be willing to choose IPM product, provided the present choice does not lower utility beyond the base level. Specifically, an individual's preference for safe alternative is a function of the change in utility:

Environmentally Sound Alternative = f (ΔU)

Where ΔU *is* the change in utility and $f' > 0$ … … … … (1)

An individual's consumption choice of safe alternative is a function of the change in utility in terms of improved health arising from the consumption of IPM. Since the choice of one product over another is a discrete one, it is convenient to cast choice in a random utility[5] setting. In this setting, an individual's utility function, and hence utility arising from the choice of alternative, is composed of a deterministic component and a random component. The deterministic component reflects observable alternative specific factors (i.e., attributes) that influence the level of utility realised by choosing the ith product. The random component represents unobservable factors, such as unobservable variations in preferences, random individual behaviour and measurement error.[6] Alternative i is chosen if and only if the utility arising from its choice exceeds the utility arising from the currently consumer product.[7] Put another way, the ith alternative is chosen if and only if the change in utility (arising from a switch in products consumed) is positive.

Based on the conceptual framework, a model is formulated to analyse the relationship that links health experience and risk perception in a farmer's decision-making process for alternative pest management. The framework is specified as follows:

$$ESB = h\,(RP, HE, Z) + \epsilon i$$

Where *RP* represents farmer's perception of pesticide associated health risk, *HE* represent health effects a farmers observed while using pesticide, *Z* represent other variables included in the equation, *ESB* defines the environmentally sound behaviour of pesticide use and ϵi represents random error.

[5]Random utility theory is characteristically identified with preferences that are associated with the design of discrete choice experiments.

[6]In the random utility model, the utility function is expressed as $U_i = X'ß + \varepsilon_i$, where U_i is the utility arising from the choice of the *i*th alternative, $X_i'ß$ is the deterministic component of the utility function, X_i is a vector of observable alternative specific factors that influence utility, ß is a parameter vector and ε_i is the random component.

[7]Alternative i is chosen if and only if $U_i > U_j$ for all $j \neq$ i (or that $\Delta U = U_i \tilde{-} U_j > \tilde{0}$). Willingness to adopt IPM can be re-written, without loss of generality, as IPM = $X'ß + \varepsilon_i$, where $X = X_i - X_j$ and $\varepsilon = \varepsilon_i - \varepsilon_i$.

The equation is restated as:

ENVIRONMENTALLY SOUND BEHAVIOUR OF PESTICIDE USE = f (RISK PERCEPTION, HEALTH EFFECTS, AGE, FARM SIZE, INCOME, EDUCATION, TRAINING, DISTRICT DUMMY) + ξ_2

Thus in the equation, farmers' behaviour of pesticide use is specified as a function of risk perception, health effect, age, education, income, farm size and training. The region dummy is also included in the equation to see possible differences in farmer's decision with respect to location. To test the stated hypotheses, the environmentally sound behaviour (ESB) variable is constructed based on data collected from the survey, where respondents were asked that thinking about adverse health effects of pesticide use, whether they adopted any alternative pest management technique such as integrated pest management which is supposed to be environmentally sound. A positive answer is taken as environmentally sound. Environmentally sound behaviour is hypothesised positive with health effects, education, training, income and age.

The dependent variable takes the form of binary response variable, hence binary response (probit or logit) models are available. The probit model will be used here. The latent variable *yi** as follows:

$$Y_t^* = X_i\theta + e_i$$

Where e_i is independent of X_i, θ is a K _ 1 vector of parameters, and $e \mid x \sim$ Normal (0, 1). Instead of observing Y_t^*, we observe only a binary variable indicating the sign of Y_t^*:

$$Y_i = 1 \qquad if\ Y_i^* > 0$$
$$Y_i = 0 \qquad if\ Y_i^* \geq 0$$

6. EMPIRICAL ANALYSIS OF HEALTH EXPERIENCE, RISK PERCEPTION AND ENVIRONMENTALLY SOUND BEHAVIOUR OF PESTICIDE USE

This section examines to what extent farmers engage in pest management practices that are considered environmentally sound in relation to health effects. A probit model was used to examine the relationship between health experience and alternative pest management practices. The probability of alternative pest management practices used was also assumed to be a function of farm size, farmer's characteristics and farmer's attitudes toward pesticide-related health experiences. The incorporation of the additional variables controls for factors that may be associated with health experience as well as decisions about using alternative pest management practices and thus allows isolation of the effects of health experience.

Table 2

Maximum Likelihood Estimates of Probit for the Use of Alternative Pest Management Practices

	Dependent Variable = IPM	
Independent Variable	Estimated Coefficients	Z-scores (P)
Perception	.4762618	2.97 (0.003)
Health effects	–.1566526	–0.41 (0.687)
Training	2.012281	6.87 (0.000)
Farm size	–.006086	–0.85 (0.396)
Income	.0074283	0.32 (0.749)
Age	.0071272	0.50 (0.616)
Education	.0809879	2.43 (0.015)
District dummy	–1.155681	–3.21 (0.001)
Constant	–2.400256	–3.53 (0.000)

–*Values in parenthesis are P values.*

The probit results did not support the hypothesis that farmers who have had an adverse health experience related to pesticide use are more likely to adopt sound behaviour of pest management than farmers who have not had such experiences. The lack of information or access to these methods is likely a contributing factor which did not allow many farmers to have proper awareness about alternative pest management practices. The non-existent or the absence of information on other methods of pest control and pro-pesticide extension made farmers biased in favour of pesticide use. As a result, alternative methods are locked out and pest control/management technology became almost synonymous with the use of pesticide. Therefore, farmers consider pesticide as the only crop protection method in this part of Pakistan. Hence, improving farmers' awareness and access to other methods will be necessary for their adoption of alternative crop protection practices.

Neither farm size nor income of the farmer had any effect on alternative pesticide use. Age is also not significant to alternative pesticide use. Training in safe-handling of pesticide had positive effect on alternative pesticide use and this effect is very strong also. Similarly, risk perception and education significantly affects alternative pest management practices. Among districts, alternative pest management practices are more likely prevalent in district Lodhran.

Predicted probabilities and marginal effects from the estimated probit model are presented in Table 3. Result shows that the farmers with heightened risk perception are more likely to adopt alternative pest management practices than farmers with less heightened perception. Similarly, controlling for other variables, the probability of alternative pesticide use among more educated farmers is higher than less educated farmers.

Table 3

Predicted Probabilities and Marginal Effects from the Estimated Probit Model

	Dependent variable = IPM Predicted probability=.0311968	
Variables	Marginal effects	Z-scores (P)
Perception	.0306913	2.77 (0.006)
Health Effects	–.0130484	–0.44 (0.657)
Training	.4323269	6.87 (0.000)
Farm Size	–.0026829	–0.22 (0.826)
Income	.006383	0.47 (0.640)
Age	–.0017495	–0.17 (0.866)
Education	.0137491	2.41 (0.016)
District Dummy	–.0750914	–3.21 (0.001)

The data did not appear to confirm that farmers who experienced health problems while using pesticide are more likely to adopt alternative pest management than farmers who have not had such experiences. Multiple reasons as reported by farmers may explain this comportment.

- The most important reason of not using alternative pest management techniques is that farmers in study area either haven't information about the availability of alternatives techniques to pesticide or haven't access to these alternatives. So they are forced to use pesticide despite their reservations.
- Generally, farmers are over cautious about economic losses. Since pesticides are easily available even at door-steps, they tend to use pesticide frequently to avoid crop damage. They do not want to use any alternative pest management technique that is not well tested or that is not believed as effective as chemical pesticide. Further IMP is not practiced on a large scale; therefore most of the farmers are unaware of its utility.
- Practically, most of the farmers are uneducated coupled with non-existent agriculture extension services let pesticide companies succeed to convince farmers through powerful advertising that without pesticide use crops cannot be protected from pests; hence pesticide are considered an integral part of present day agriculture in the study area. Furthermore, these companies/pesticide dealers also succeeded to speeding up the use of chemicals in agriculture by providing different services and offering lucrative incentives involving distribution of pesticides, sprayers and fertilisers on advance or in many cases free distribution of these items, and lotteries/prizes which ultimately leads to encourage the use of pesticide over other natural alternatives available to farmers.
- Agriculture extension is pro-pesticide in the study area. Further, it is also not oriented to the shift of information related to the dangers inherent in the use of pesticide. Due to cultural believes regarding health effects or farmers inability to distinguish health effects related to pesticide use, it is likely that health effects arising from pesticide use are grossly-underestimated. Farmers take many of health effects a routine matter and are not very serious to take steps to avoid these problems.

Controlling for other variables, the probability of alternative pesticide use among farmers who received training of alternative pesticide use/safe handling is significantly higher than the farmers who did not receive such training. Hence training appears to discourage pesticide use in the study area. However, evidence indicates that there is lack of formal training on safe handling and IPM use. Only 10 percent of the farmers reported receiving formal training on safe handling and better management of pesticide. The result is very much similar to that found by Dasgupta (2005a) in Bangladesh where farmers reported similar trend. Therefore, speeding up the formal training in IPM may be a workable solution to reduce health and environmental damages. However, strong institutional support is required to extend the scale of IPM training.

Coming to insignificant relationship between age and alternative pesticide use. The age of the farmers appeared in the negligence of pesticide related health impairments. As reported by Ajayi (2000) that with the increase of age (experience of pesticide spraying), farmers are likely to think less of the health problems that are associated with pesticide use. They are ready to accept a certain level of pesticide associated illness that in turn reflects their hesitation to adopt alternative pesticide use. Above explanation seems applicable in case of present study, since age appears negative but non-significant to risk perception.

Finally, the insignificant results of farm size and income indicate that in addition to farmer's health characteristics, wealth characteristics are also less likely to motivate farmers to adopt more sustainable practices. The analysis underscores the fact that human capital characteristics (e.g. education, training and awareness) of farmers appear to influence their decision for more sustainable practices than land characteristics (e.g. farm size).

7. CONCLUSION AND POLICY IMPLICATION

The present study analysed the current crop protection practices with the view to identifying the prospects and the constraints to improve crop protection methods. The study reveals that pest management is pro-pesticide in Pakistan. Government policies (pro-pesticide extension system, soft rules for import of pesticide and other support measures) either directly or indirectly encourage farmers to use pesticide to achieve higher crop yields. Over the years pesticide encouragement policies have led to erosion of alternative pest management practices among farmers in cotton growing areas. Farmers are not well conversant to integrated pest management (IPM) practices and they have no choice except to use pesticide, even their health concern.

The study concludes that cultural believes (ignorance) regarding pesticide related health effects, lack of information regarding and/or non-existent alternative pest management and fear of economic losses remains the main barrier in adoption of more sustainable pest management practices. In addition, the powerful consumer services network by pesticide companies perpetuating the vicious circle of pesticide use and serving as the chief barriers to switching to alternative pest management strategies. Therefore in seeking for a better solution to pest management problems and negative externalities of pesticide use, the priority issues are not just how to set up regulations and policies that would ban pesticide use in crop production, but how to use pesticide correctly and safely and avoid its misuse and overuse, so that farmers could internalise

the negative health and environmental externalities of pesticide use and find better pest management solution. There is also a strong need to convince farmers that pesticide use is not the only way of controlling pests. Hence, improving farmer's knowledge of pest management and pesticide safety issues are critical. The availability of alternative pest management techniques is also an issue which should be resolved. Although some farmers decide to adopt alternative pest control strategies but such services are largely not available to farmers in study area. The study stresses that increasing use of farm pesticide cannot be effectively checked if there is no practical alternative pest management technology available.

The results of the study bear some implications for policy formulation.

(1) Government should commit further resources to research and training in integrated crop management with an orientation towards the reduction of pesticide use and safe use of pesticide. The results which indicate that heightened risk perception and IPM training are the main determinants of safe behaviour of pesticide use offer opportunities to integrate IPM technology into current crop protection methods. The feasibility of the IPM technology has been highlighted by many studies [e.g., Azeem, *et al*. (2002, 2004)] which were conducted in the cotton growing area of Punjab. In addition, the common belief among farmers that pesticide are getting less and less effective than before makes this claim stronger that the farming community in study area will warmly welcome IPM methods of crop protection.

(2) An important implication is that the investment of public resources in providing information can be effective even when resources for a more detailed intervention, such as provision of alternative pest management or enforcement of pesticide related laws are lacking. The government should strengthen information and services[8] provided by the agriculture extension for plant protection. The interventions can take many forms, including media events, NGOs and community programs undertaken to promote awareness and understanding of the risk issues. Intervention should also include social institutions (e.g., community leaders) that can help making farmers become aware of the risk and subsequently leads to some sort of change in knowledge, attitudes and behaviours.

APPENDIX

Risk Perception: This variable measures whether or not farmers perceive pesticide a potential danger to their health, particularly when mixing and applying pesticide. It is very important in the course of behaviour change since it motivates individuals to adopt measures to protect themselves from negative environmental conditions. Risk perception is specified as no risk at all=1 to very high risk=5. In defining the variable, the study follows a similar method used by Lichtenberg and Zimmerman (1999).

Health Effects: As farmers mix and spray pesticide, they are naturally exposed to the toxicity of the chemicals. Exposure to pesticide can lead to number of health effects, depending on the pesticide's toxicity and the dose absorbed by the body [Dasgupta (2005a)].

[8]There is a need to overhaul current extension services by improving their knowledge on the changing trends of pest populations.

Health effects variable is very important in the course of behaviour change. It heightens risk perception which ultimately motivates individuals to take protective measures to minimise health risk. Health effect is specified as whether or not farmers experienced negative health effects during or short after mixing or spraying operations. The health effects of pesticide exposure are manifested as specific symptoms or a combination of multiple symptoms. Building on WHO information as well as earlier studies, 10 types of symptoms were first identified. The question was also left open to include others if reported (any). The study focuses on acute health effects, as a detailed medical examination of sample farmers was beyond the scope of this study. Study relied on self-reported health effects, where farmers were questioned if they experienced any health impairment after mixing and spraying pesticide. Following Dasgupta (2005a), the health effects variable is defined as whether a farmer experienced at least one symptom (=1) or not (=0). Given the results of previous studies and theoretical background health effects is expected to have a positive relationship with alternative pest management practices.

IPM: The IPM variable is very important in the present context since this study makes an explicit link between illness experiences and coping strategies. It measures whether or not farmers adopt alternative pest management technique such as integrated pest management which is supposed to environmentally sound. It is worth knowing that IPM focuses on the adoption of various pest management practices regarded as environmentally sound/beneficial and either substituting for or supplementing pesticide use while not necessarily eliminating pesticide use.

Education: Education is expected to have positive impact on coping behaviour. The more educated people are expected to rank higher risk perception and subsequently adopting IPM practices owing to better awareness. For the purpose of analysis, the respondents were grouped into seven groups based on the education level—from 1= illiterate, 2= 1 year of schooling up to 4 years, 3=from 5 years up to the 7 years, 4= 8 years up to 9 years of schooling, 5= 10 years up to 11 years, 6=12 years up to 13 years and 7= 14 years and above.

Income: Income is the total monetary equivalence of all expenditures made by the household in the farm of cash plus total value of household grown agriculture products kept for household's consumption during a month. The household grown products also includes livestock's produced dairy products. Household were also asked about variations in income during different seasons.[9] The income is defined in rupees and is expected to impact risk perception, protective behaviour and IPM positively. It is based on the reasoning that high income individuals are more likely better aware and better informed and can afford protective measures.

Age: This variable represents farmers' age and is used as a proxy for farmer's experience and management capacity of pesticide operations. Compared to youth, adult are also assumed to be more caring. Given that farming is the major vocation in the study area and most of the individuals are introduced to farming as early as their youth, it is assumed that their age will better reflect pesticide hazard [Ajayi (2000)]. As prior expectation age is positively related to risk perception, protective behaviour and IPM.

Training: Training is also a variable of interest. An individual usually undertake training with the ultimate goal to avoid pesticide exposure. A trained farmer being better informed is expected to perceive more risk and engage in better management practices.

[9]Based on the understanding that livestock generates products like milk, eggs and the like items are not always same throughout the year. Similar reasoning holds for agricultural products like fruits and vegetables.

The training variable is defined as whether a farmer got training of safe handling of pesticide (=1) or not (=0)?

Farm Size: Based on the prior evidences [NFDC (2002); Jeyaratnam (1990); Forget (1991)] which states that agriculture extension services often limited to big landholders, farm size is assumed to be positive to risk perception and alternative pest management practices. Additionally, farm size is taken as the proxy of duration of pesticide exposure, since larger the farm size, higher the likelihood that farmers spend additional hours in spraying/farming activities. Therefore, carrying higher probability of being exposed to pesticide.

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Macroeconomic Management in a Decentralised Set-up

IJAZ NABI

I am thankful to PIDE for giving me the opportunity to be here and participate in this important discussion. It is always exciting to come back to this audience because this is where I started my career as an economist. We have with us Dr S. M. Naseem and Dr Nawab Haider Naqvi who guided me in my earlier years and I would like to thank them also.

I will try to restore some balance after Dr Ashfaque's alarming comments on the state of the economy, recognising well that we have challenges that need to be addressed. Mr Baldridgde in his discussion has given us fifty questions that capture many of the challenges. But first let me say a few words about whether politics should triumph over economics or the other way around. Lets not forget that we have a democratically elected government that represents a delicate coalition of several political parties and competing political interests. In this setting, it is not at all surprising that technocratic economic solutions are secondary to the political ones, and that "economics does not triumph over politics" as lamented by the previous panelist. In a democratic framework, the economists' role is to ensure that political objectives are met without inflicting an unsustainable fiscal burden and sacrificing the long term development objectives.

A democratically elected government has to address the core political issue facing Pakistan, i.e., the dissatisfaction expressed by smaller provinces based on the perception that they do not get a fair share in the country's resources such as the central pool of revenues, water etc. This requires addressing the legal framework and the institutional mechanisms for sharing resources. To be helpful, economists can pose the question as to what would be the development outcomes associated with the 18th amendment of the Constitution and the 7th NFC award in the next 5 to 10 years.

A core outcome that would need to be assessed is whether the new arrangement improves overall economic management in the country enough to avoid the boom and burst cycles the economy is subjected to every four or five years. Underlying the boom and bust cycles are two critical issues. One, have we strengthened the fiscal side adequately which means both the revenue side as well as the expenditure side? And, two, have we addressed the international competitiveness of the economy to attract investment for increasing and diversifying our exports? The latter would also allow us to identify and address the factors that have held back industrialisation to create the kind of jobs a society needs in order to have continued improvement in standards of living.

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The other core development outcome to assess the new resource sharing and decision making arrangement is whether or not it will allow improved delivery of social services. Not all public sector delivery in Pakistan is bad. We do very well on infrastructure. But when it comes to health and education, we lag behind others at the same income level.

Economists need to debate whether amending the constitution and changing the NFC award will help in achieving these development outcomes. The way I look at it, the design of the new arrangement does not explicitly address the core development challenges adequately. That does not mean that the change was not needed but that it is a crucial first step that needs to be followed up with detailed technical work to ensure that the two key development outcomes I outlined earlier improve as a result of this major shift towards decentralisation. One wishes that the detailed technical input for making this assessment and therefore incorporating it in the design of the new NFC award had been taken earlier. But we are where we are. We should thus look at the award as an important step forward but one that will need continued fine tuning in order to improve development outcomes.

One example of where more work is needed is provincial revenue generation. We could have designed revenue sharing under the 7th NFC award to incentivise improvement in local tax collection such as the property tax, agricultural income tax and the value addition tax on services. Thus Punjab would get more from the central pool for improved collection of the property tax; Sindh would get more for delivering on the huge inequality in agricultural holdings via a highly progressive agricultural income tax. I do not know what the political imperatives were to announce the package when it was announced. Had we have more time, we could have built these revenue improving incentives into the design of the new award.

Anwar Shah is with us today and he will tell you that international experience shows that such incentives can also be built on the expenditure side. For example, the design of inter-state revenue sharing incentivises not only additional revenue collection but also can help improve expenditure management.

The design of the new NFC award could also have been more explicit on delivery of services to the citizens especially social services by being more specific on achieving, for example, improvement in enrolment at various levels of education, in the provision of primary health care and social protection.

All is not lost. The Council of Common Interests and the National Economic Council are strong institutions that will oversee implementation of the constitutional amendment and the NFC award. They are responsible for ensuring that the desired economic outcomes are achieved. To carry out this responsibility, CCI and the NEC need to strengthen capacity in three areas. They should help create an independent office of Statistics that collects timely and credible information on key aspects of the economy. Technical analytical capability is also needed to monitor and assess development outcomes associated with the decentralisation. A strengthened PIDE would be the right institution to do this. An institution akin to a leaner and more agile and technically capable Planning Commission would also be needed to assist the provinces in better design of projects that address the key development challenges efficiently. The NEC and the Council of Common Interests, working in tandem, should be able to say to the

provinces, "Look, we have given you a lot more money, are you using it sensibly to achieve your development goals? Are you collecting more of your own revenues? If you are, here is some more money from the central kitty; if not, let us help you collect more revenues and spend them better before you ask for more money". Such a conversation is possible only if the NEC and the CCI have the backing of the three institutions I just mentioned. Without them the CCI and the NEC we will not have the ability to assess whether this monumental shift in the way moneys are to be allocated and spent will give us the desired results on critical aspects of economic management I outlined earlier.

The challenge for us economists in conversations when we appear on television, write columns in newspapers, participate in forums such as today's conference, or when we undertake serious research is to hammer away at what the desired shape and capability of the supporting institutions would be to monitor, assess and design the key development challenges. The time for questioning the appropriateness of the 18th amendment and the supporting NFC award is now behind us. Instead, lets focus on getting better development outcomes from these important step towards decentralisation.

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Macroeconomic Management in a Decentralised Set-up

WILLIAM BALDRIDGDE

The issue of macroeconomic management in a decentralised set-up is a big question. My part of discussion will get more down into the nuts and bolts and as you see I will unfortunately ask a lot more questions. I think that it is very important that all parties have begin to equip themselves with relatively detailed knowledge of what is likely to occur in the shape and structure of government processes as the devolution of authority in 18th amendment begins to take place. It occurs to me the development stakeholders or the government of Pakistan and the provincial ministries of finance, the Planning Commission and the CCI and potentially others even including the international community. I think these bodes need to know how this devolution can actually occur. What are the actions necessary to develop a transparent budget and an auditable budget, procurements in expenditure processes at the provincial level that were administrated by the federal level in order to avoid macroeconomic management to continue to occur in decentralised set-up. The current arrangement provides as far as I know bulk of resources to be collected and controlled with the federal level. Also there is a significant share of responsibility currently with the federal government. These distributional arrangements will necessarily change as the budgetary regulatory framework for the 18th amendment becomes agreed upon. This regulatory framework is not really in place yet. A regulatory framework would need to be enacted and implemented. This means to me at least that an assessment of pre-18th amendment situation is needed to provide a base line to understand how the new structure will have to be reformed. An assessment perhaps should be done with a review of existing policies or to sort out what were the initial conditions going into 18th amendment. I think as federal and provincial governments are moving towards implementation, at both budgetary and operational levels, a few questions may be needed to be asked. One is how will the new responsibilities assigned to the provinces be financed? What will happen to federal government staff currently engaged in doing all the functions will no longer be with the federal government. How will the human and operational capacity at the provincial government level be developed with a particular emphasis on budgeting expertise and expenditure expertise. If there is going to be control and management at macro level, then there is going to be a tremendous amount of capacity required at the budgeting and expenditure level in the provinces. I think an assessment of the provincial capacity is a good idea. An assessment

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would perhaps address processes, practices and capacities that already exist in the provinces to assume the additional work which is going to be entrusted to them by the 18th amendment. This assessment could include practices and capacities that already exist and determine what are your legal systems that are in place in the areas that will see increased involvement by the provinces. So a key question to me is what are the practices and institutions that are needed to make the finance dimension of the 18th amendment fully operational. I am just focusing here on the inter-government finance dimensions of the 18th amendment—how to make the inter-government finance component fully functional operational in Pakistan quickly. The gaps in human resources, the gaps in the regulatory framework, the gaps in institutional strength should be identified in detail and then recommendations perhaps should be taken on board. Things to look over the in terms of gap analysis would be, laws and regulations that need to be adopted, practices in each of the four provinces will need to be changed, practices at the federal level will need to be modified, old regulations or reforms which are many, addition of human resources certainly at the provincial level, perhaps even approaches at the donor community level should be adjusted to help, how far these capacities to shift away we do government to government assistance. I am basically saying that there are a lot of questions that need to be looked at before we are fully operational how to do this. One area is to look at tools and techniques currently used today to examine report on the current budget. What are the inputs received from lines spending in it and, central, federal, financial and planning organisations from the provinces? What input does the centre require from the spending units in provinces and do they use the same budget codes, the same economy codes, same fiscal data. Is that data entered and communicated electronically or manually and if manually, are the systems in place and clear enough and were more enough for easy transfer of data from provinces to the Centre? What is the ability to produce budget reports across different sectors of the government hopefully by economic classification code and by economic activity? What is the state of ability to report across sectors and across provinces? What is the current state of play in budget preparation at the provincial level? What are the strengths and weaknesses in the budget process and what is the role of stakeholders today in the budgetary process, to what extent is the budgetary process either stakeholder driven or at least a stakeholder-informed process? What is the transparency of budget development process and what are the steps needed to garner increased levels of legitimacy for decisions made during budget review and budget approval process. If budget is not perceived by public as legitimate and reflective of their priorities, that is a problem. There is a need to public communication and public awareness in the budget process. Where does that stand today? How is the expenditure tracking and expenditure monitoring in the provinces? Is there an emphasis on transparency mechanisms in the public expenditure structure? Once this money starts to be expended at the provincial level, provincial governments and their constituents are even going to feel more serious than ever about the transparency of expenditures. What is its capacity to be transparent about budgetary and expenditure information now? Budget management is another area. Does the budget formulation process currently allow respective governments, provincial or national to become more proficient in identifying, formalising and in executing what the strategic priorities are as the country shifts to evolve a budgetary process strategic priorities are going to take a whole new order of

significance at least at the federal level. Is the annual budget planning and development process developed within the context of a medium term expenditure framework and does that annual budgetary process along priorities to be harmonised with the medium term expenditure framework. Are annual budgets sufficiently clear and informative to facilitate our legislators adopting budgets and managing or monitoring or the execution of budgets? Is results-based budgeting a new undertaking in the provinces and therefore not something to look at? Either in the provinces or at the federal level, does civil society, take a grass roots approach to budget formulation and execution. If now, is more civil society engagement in budget formulation and execution monitoring needed?

Are safeguards in the provinces in place to begin to spot abuses or the ways to improve processes to put a more auditable system and more auditable expenditure processes in place? Budget and expenditure institutions organise among functional assignments nor the needed functions in revenue generation to match the job descriptions to human skills…….. to ensure a match up with the job descriptions and services needed. The question for the young economists could be whether demand for your services exist outside Islamabad, out in the provinces to control over expenditure, to ensure integrity of appropriations, do commitment control, manually or electrically manager payment functions, rationalise the expenditures so that accounts at the provincial level are not overdrawn as the expenditure year goes on or sort of relation of daily basis in place to be drawn on in budget formulation. The basic question is a common check of accounts in place at both the provincial and federal level. --------- If not, quick adjustments have to be made. Do expenditure tracking tools exist at both levels of government, federal and provincial so that expenditure tracking can occur so that the provinces can notify the extent at various expenditures particularly in different categories. Can we acquire similar accounting system at the provinces and the federal institutions, integrated communication systems, are management system integrated? Are staff trained in similar ways at the various levels of government? Does your managerial approach train to develop common practices and procedures and to develop staff in all the four provinces as something like the same speed, developing the same skills at the same time?

Legal or regulatory framework needs to be developed at the provincial level on public finance and public accountability that at the federal level.

Does this public finance law contain comprehensive rules and procedures that we expect the principals of public funds can be spent without an appropriation by ..Does at each of the provinces where the public finance manager was required cabinet or proposals Another big area to work into is institutional capacity. At federal level does the Ministry of Finance, Ministry of Planning structure simple and effective communication between other departments at the federal level of government along with the provinces. Does it separate policy making and policy execution? Because as the federal level law changes, more distinction between policy and execution can emerge. Does it contain a core unit of treasury and budget and economic and fiscal policy, revenue administration and revenue management at the provinces? That might be worth sorting out. At the federal level, is there a treasury single account? That will be critical as well in the four provinces. This would enable better data management unit. Where are we now on the right to borrow. How is the right of the provinces to borrow going to be balanced with the concept of implicit federal guarantee? Who approves that provincial borrowing at the

federal level? What is the law of the central debt management unit? Cash management functions at the treasury, are they good enough to ensure the liquidity of the treasury single account? Do revenue collection functions exist adequately at the provincial level? These are some of the questions that might need to be looked at. Devolution of fiscal and budgeting implies a huge amount of human capacity which speaks to ….. the younger people here. I think you probably have good time taking a deep dive what the capacities exist in this area. That is all.